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ABSTRACT

A two-day Health Manpower Planning Conference was held at State College, Pennsylvania, in 1971. The speakers represented a variety of organizations with responsibility for aspects of manpower planning and others not normally involved in planning. Program content was structured in such a way as to broaden the context within which manpower issues are defined and solutions sought. Titles of the papers and authors are: Overview of Alternative Planning Models Currently Used in Health Manpower Planning, Mary F. Arnold; National Policies and Priorities--Their Implications for Health Manpower, Leonard Lecht; A Micro Methodology and the Disaggregated Data Requirements for Analyzing Physician Productivity, Kenneth R. Smith; Effects of Large Information Systems on: Manpower Planning Decisions, Resource Allocation, The Setting of Manpower Requirements, Robert J. Mowitz; The Manpower Data We Have Versus the Data Questions We Ought to Be Asking, Royal A. Crystal; Decision-Making in Health Manpower, David B. Hoover; Insights from Cost/Effectiveness Analysis, Peter Meyer; The Effect of Industrial Engineering on Hospitals and Implications for Reimbursement, Harvey Wolfe; Variables Related to Change, John Rizzo; and The U. S. Congress--Resource Allocation Decisions, Gerald Jasinowski. The conference's program agenda and registration list are appended. (NH)

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HEALTH MANPOWER PLANNING CONFERENCE

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May 17 and 18, 1971

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Hospital Educational and Research Foundation
of Pennsylvania
1200 Camp Hill By-Pass
P. O. Box 608
Camp Hill, Pennsylvania 17011

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CONFERENCE PROCEEDINGS

HEALTH MANPOWER PLANNING CONFERENCE

May 17 and 18, 1971

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1200 CAMP HILL BY-PASS / CAMP HILL / PENNSYLVANIA

TELEPHONE
AREA CODE 717
233-7621

P.O. BOX 608
CAMP HILL, PA. 17011

INTRODUCTION

On May 17 and 18, 1971, The Hospital Educational and Research Foundation of Pennsylvania (HERF), in cooperation with the College of Human Development at The Pennsylvania State University held a "Health Manpower Planning Conference" at the Penn State Conference Center, State College, Pennsylvania. The conference was supported through the Foundation's Health Manpower Intelligence Facility Project funded by the Bureau of Health Manpower Education, National Institutes of Health, Department of HEW.

Invited to the conference were representatives of a number of organizations from Pennsylvania and surrounding states, who had responsibility for some aspect of manpower planning. These organizations included the comprehensive health planning agencies, state government agencies, representatives of higher education, professional associations, and various other health organizations. Program content was structured in such a way as to broaden the context within which manpower issues are defined and solutions sought. This was done by using people from a variety of disciplines related to health manpower but whose contribution and applications are not usually included in the health manpower planning process. The speakers were chosen because each, from within his own discipline, had become involved in an aspect of manpower planning. The speakers represent the fields of economics, public health, public administration, industrial psychology, industrial engineering, operations research and systems management engineering, and political science -- both theoretical and applied. Further input came from speakers representing the Federal Government, specifically the Bureau of Health Manpower Education and the Community Profile Data Center of HSMHA. Each speaker discucsed his research findings or his own particular area of knowledge in relation to manpower issues and/or their effects on planning.

Several speakers brought research colleagues with them, adding an additional dimension to the conference. The audience was thus made up of two groups; the generalist planners/state government etc. group who have to respond almost daily to new problems in health, and the academic-based researchers who are primarily concerned with technical and methodological approaches to more general health problems.

In retrospect the initial concept of bringing together a variety of disciplines to focus on health manpower issues is sound. However, it is difficult to comprehend all the relationships implied without specific case studies and examples. Evaluations by the conferees indicated a need for small, problem-oriented discussion groups in which the "speciality" disciplines would assist in defining and attacking a specific manpower problem. In this way, the conferees felt, the interrelationships between diverse disciplines and manpower planning issues, and notions of how to use those relationships in manpower planning programs, could be made more clear.

It is hoped that this collection of papers presented at the conference will be useful to the individuals and groups charged with responsibility for health manpower planning.

Conference Coordinators:

JOANNE MASURET, Director
Health Manpower Project, HERF

Raymond H. Giesler
Executive Director, HERF

TABLE OF CONTENTS

Overview of Alternative Planning Models Currently Used in Health Manpower Planning	Mary F. Arnold, Dr. PH
National Policies and Priorities - Their Implications for Health Manpower	Leonard Lecht, Ph.D.
A Micro Methodology and the Disaggregated Data Requirements for Analyzing Physician Productivity	Kenneth R. Smith, Ph.D.
Effects of Large Information Systems on: Manpower Planning Decisions, Resource Allocation, The Setting of Manpower Requirements	Robert J. Mowitz, Ph.D.
The Manpower Data We Have Versus the Data Questions We Ought To Be Asking	Royal A. Crystal, M.P.H.
Decision-Making in Health Manpower	David B. Hoover, M.P.H.
Insights From Cost/Effectiveness Analysis	Peter Meyer, Ph.D.
The Effect of Industrial Engineering on Hospitals and Implications for Reimbursement	Harvey Wolfe, Ph.D.
Variables Related To Change	John Rizzo, Ph.D.
The U.S. Congress -- Resource Allocation Decisions	Gerald Jasinowski, M.S.

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The opening speaker for this Health Manpower Planning Conference is Dr. Mary F. Arnold, Professor of Health Planning and Administration, The Pennsylvania State University. Dr. Arnold received a doctorate in public administration from the University of California at Berkeley where she was a faculty member for a number of years before coming to The Pennsylvania State University. Dr. Arnold holds an MPH from the University of North Carolina and a B.S. from Smith. Her particular professional interests involve organization theory and management, particularly organizational structure. She is also involved with "futures" planning and attended the World Future Society annual meeting just recently. Her research activity has included work related to consumer participation. One such project involved a training course dealing with policy matters and decision-making roles of consumers in neighborhood health centers in the San Francisco Bay area. Dr. Arnold has also participated in projects involving health officer decision-making and has been particularly interested in community coordination. This morning Dr. Arnold will begin our conference by providing an overview of health manpower planning and planning models in current use. It is my pleasure to introduce Dr. Arnold.

OVERVIEW OF ALTERNATIVE PLANNING MODELS CURRENTLY USED IN HEALTH MANPOWER PLANNING

By
Mary F. Arnold, Dr. PH
Professor of Health Planning and Administration
Pennsylvania State University

As a person who came into the health field because I had a nickel and a half-hour to kill, I have always been somewhat skeptical about manpower planning. (I used that nickel to call a distant cousin, who unknowingly set the wheels of fate into motion so that two weeks later I found myself in a School of Public Health.) My skepticism stems from several sources -- my own recruitment to the field; the drop-in-the-bucket recruitment efforts with high-school and college counselors on which most professional organizations have spent a great deal of time and energy; the early efforts to use ratios of personnel to population to identify a "good" or "bad" situation for an agency or a community program. The obvious illogic of these kinds of efforts led me to turn away from manpower problems. So it is with some trepidation that I come before you, for I have a nagging feeling that I may just be reinventing the wheel.

Let me first state that I am assuming that planning implies that one is working toward the achievement of a desirable future state. There are those who define planning as "intelligent cooperation with the inevitable," but I believe there are some conditional states in the future over which we may have some control. Planning, as a concept therefore, includes all those uncertainties that make up the future; but also indicates what we would like the future to be.

Most problems with which we contend are defined in terms of our perceptions and the problem of manpower is no exception. This conference brings us a variety of perspectives to the manpower problem. My role will be to identify conceptually, some of the perspectives from which this manpower problem can be analyzed.

The Planning Process

Planning is a process by which one goes through a series of exploratory and analytic phases until a course of action is determined and action taken. Too often the exploratory and analytic phases are cut short for we emphasize action in our culture. Health manpower planning is currently at that earliest exploratory stage of identifying the problem clearly. We have not as yet identified the basic issues. To be sure, we know something about manpower distribution; we have begun to study the problems of supply and demand; we are considering the development of new types of personnel; we are analyzing functions of personnel on the job; we are considering changes in practice acts; we are trying to find incentives that would change distribution patterns; in short, we seem to be tackling all facets of the manpower problem, however, these efforts are piecemeal.

In many ways we are like the blind men with the elephant, for we find that the manpower problem is most often described in terms of the specific interests of each investigator. If the hypothesis of choice is that the problem is one of supply, then we see efforts to increase that supply. An example is the effort to reach high school guidance counselors. However, we have the problem of determining how that initial manpower supply of people entering the field will be distributed among the various professional disciplines and specialties. We get caught up in ratios of certain types of personnel to population. But, if some of the estimates were actively extrapolated to the future, almost all of the population would be working in the health field. In general, there has been greater emphasis on ratios regarding physician and nurse manpower, perhaps because they are the key groups involved. For example, I can find little on estimates on supply needs in health administration or on computer programmers. . . . I have not seen projections for the many and varied types of physician's assistants. Although we are beginning to identify by function activities that might be performed by others as a substitute for the physician and nurse but I haven't seen any studies that compare supply needs given different organizational patterns. Instead when we focus on the supply problem there seems to be an implicit assumption that organizational forms will remain relatively static and thus, we find programs to pump more people into the training system but without a plan for distributing these appropriately for future needs.

If, on the other hand we see maldistribution as the "real" problem we know we cannot operate on a simple supply and demand basis. So often we take an economic perspective and work toward finding incentives that will pull the supply to where the need (rather than the demand) is. We applied additional federal funding to develop meighborhood health centers as a means of altering the maldistribution problem; there are plans for providing financial incentives to get young physicians to rural areas; but, the distribution of health personnel is complex. There are more factors involved than finances, transportation, communication, access to cultural facilities, etc.

Another perspective, that of professionalization and specialization, has pushed the balance of services toward the more highly technical services while primary care services are essentially dying out. Maldistribution is seen here as not the cause, but is rather the result of technical specialization. We find Medical Schools responding by upgrading community medicine and family medicine departments or a very few attempting to shorten the training period. One of the problems of specialization and professionalization is that roles, functions and domains of the various health professions become rigid and unyielding. And so we talk about training nurses, physicians and dentists together in certain core areas, that is teaching them to work in teams. We also do functional analysis of the jobs to see where changes can rationally be made.

All of these different perspectives on the problem are needed, and we must have additional information about each effort tc make changes in the system. However, I do not believe we have as yet put the animal together. We need to learn much more about this elephantine problem in all respects. Yet, if we wait to do something, the situation worsens. One difficulty is that we don't know what the consequences will be of the little changes we are now applying to the system. Are we in the long run compounding a problem as we try to solve it? We just don't know. It is hard, for example, to estimate just how much of an effect the recent emphasis in medical schools on community medicine will have. I doubt that it will have much effect for the preparation of medical students selecting this type of specialization has been low.

A few broad system models are attempting to describe the whole elephant, but it is likely to be only after we get additional knowledge through simulation techniques that we will be able to predict effects of change on the total system and effects of interacting variables on the system. In the meantime, we are caught with a problem without a broad theory that can aid us in the solution. Where does this leave us -- especially those of you who have local or state responsibility for manpower planning? Certainly I would not argue that since we don't know what the whole elephant is, we should quietly forget the matter. But, I do feel we need to recognize that we are blind men dealing with an elephantine problem, and we need to search for ways of putting our efforts in planning into a broad perspective.

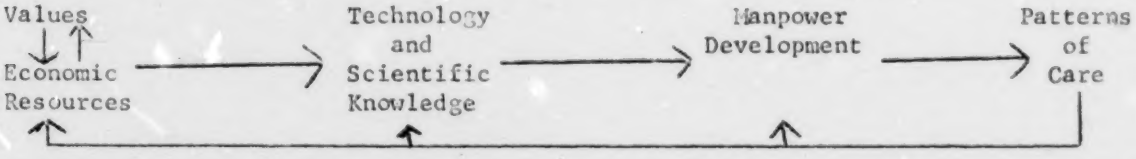
A Broader Perspective

It is obvious that manpower planning is an integral part of comprehensive planning. We would have a relatively simple job on our hands if the variables around our planning were stable. For example, if we could just assume that the health care system would remain as is, we could estimate reasonably well what kinds of personnel would be needed at what point in time and where. The real dilemma is in knowing when we are just cooperating with the inevitable and when our actions will have an effect on the other parts of the system.

To develop a broad system model for manpower it is necessary to look at the system as it seems to work now and as it has changed over the past as well as what is happening that will evoke changes for the future. If we can develop some broad sweeps of the brush, we can at least have a picture of where and in what directions the system is interacting.

Let me illustrate with a model with which some of you may disagree. Because of our state of knowledge at this point this model is purely hunch rather than a full-fledged hypothesis. (I define hunch as a hypothesis based on very little knowledge, a bit of logic and a lot of intuition.) It seems to me that one outcome of the interaction between values and the availability of economic resources is more or less emphasis on technology and scientific information. The emphasis on research in the 50's and early 60's led to a proliferation of biomedical research and an increase in the technology of medicine. One can look also to the NIMH funding which led to a great deal of study on psycho-social aspects of health and disease. As a new knowledge comes about, changes come about in the pattern of manpower development (e.g. in educational content, in socialization), which in turn creates changes in the patterns of care. The effects of these changes in patterns of care in turn feed back to change values, resource allocation, changes in research direction, and back through the cycle. (See Table 1) In our past three changes slowly evolved over a relatively lengthly time span. The crucial part of this model is that it suggests that manpower development is the drive mechanism through which changes will come about in the patterns of care. Regardless of the validity of this particular model, it is essential that we develop a broad working model that is testable and from which we can make decisions based on adequate study as to just which does come first -- manpower development or patterns of care. This is not just a chicken-or-the-egg argument because it is important for the development of our manpower planning activities. Today we are in a turbulent environment. We are seeing changes throughout the system, almost convulsive changes. But, if this is the model of choice then we see that manpower development is less dependent on current patterns of care than it is on changing values, economic resources, and available technology and scientific information. If one argues instead, that patterns of care are precedent to manpower planning we should look to a different set of indicators for future manpower needs.

Table 1



Historically, the growth of medical specialization has been a result of the rapid changes in technology and scientific information. And one result of this process of specialization has been a rather marked change in patterns of care over the past 30 years. When I was a child, the general practitioner handled almost everything. Today, we have the experience of seeing specialists for each different problem. Not too long ago I had the difficulty of being bounced back and forth between an ENT man and a Chest man. It seems my medical problem was in disputed territory. The care system that has become so fragmented didn't start that way; it has been a result of manpower development which stemmed from our rapid growth of technology and scientific information.

Assuming this broad model has validity, then it has meaning for manpower planning. In planning it is useful analytically to identify two kinds of decisions: those that relate to the desired state of the future (goals decisions) and those that relate to how to achieve best that desired future state (means decisions). But, before we can make this analytical separation we need to have a broad system model such as the one described. Only then can we being to gather the necessary and appropriate information for planning. If, for example, the paradigm holds that manpower development precedes developments in patterns of care we need then to identify in what ways manpower planning can effect changes in the care system. We have to look at alternative future patterns of care, what seems most feasible and acceptable, and then shape our manpower planning toward those patterns that seem most desirable. We need to know how action in the manpower development area can be expected to influence care patterns. Similarly we must understand what factors will influence manpower development and begin to monitor the environment for such information. Here is where intelligent cooperation with the inevitable may be a more appropriate definition of planning. This is an adaptive process. In other words it requires an understanding of the forces affecting what actions you can take. For example, resource allocation decisions for higher education and/or research will affect what can be done in manpower development, which in turn will affect what can be done to change patterns of care. The recent inefficiencies (if this is what they are) in the care system such as high cost of medical care can be traced from concerns about maldistribution of services to the old and poor feeding back to a shift in value about care as a right instead of a privilege, then to a new infusion of resources (Title 18, 19). This has led to an input of service and program monies into health services research with decreasing resources going to biomedical research. . . in turn leading to changes in manpower development.

What I am suggesting is that we need to more carefully, scan the environment influencing manpower development, and then predict how this will influence how we can make appropriate changes in the patterns of care. We must think of our manpower problem not as a beginning or end product, but rather as a subsystem in a very complex system. But, until we do put our manpower activities in context with the broader system we will not have a means of assessing or determining appropriate action.

Perhaps part of our problem is that we really are unclear about the direction in which we wish to go. The health field has a propensity for setting ideal ever-receding goals. We want everyone to have care available, but not just care. . . rather we talk about quality care, which we find hard to define. And we want this done efficiently, within some unknown constraint of resources. James Thompson suggests that if our beliefs about cause and effect are certain and if our outcome is clear-cut, we can use efficiency evaluation; if, however our beliefs about cause and effect are uncertain and we have clear-cut goals or outcomes we can use effectiveness as our evaluative measure. Our problem in health manpower planning is that our beliefs about cause and effect are uncertain and our goals are diffuse, leaving us without a method of evaluating our action. Perhaps if we can take a broader system view we can begin to become more knowledgeable about our directions and how to get there.

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[1] James D. Thompson, Organizations in Action, New York: McGraw Hill, 1967.

Dr. Lecht received his Ph,D. from Columbia University and is currently Director of the Center for Priority Analysis of the National Planning Association. Over the years Dr. Lecht has been involved with research dealing with the impact of new national programs and legislation on the manpower needs of various fields. This focus has continued to the present time as he is involved in a number of such research projects now. Recently he spoke before the National Health Council Health Forum in San Francisco about health manpower needs in the 1970's. He is also the author of a recent book entitled, Manpower Needs for National Goals for the 1970's. It is my pleasure to introduce Dr. Leonard Lecht.

NATIONAL POLICIES AND PRIORITIES - THEIR IMPLICATIONS FOR HEALTH MANPOWER

By
Leonard Lecht, Ph.D.
Director
Center for Priority Analysis
National Planning Association

I propose to begin with a few words about the National Planning Association. We are a nonprofit research organization in Washington. Basically we look at the future using numbers. Being a nonprofit organization, we are largely although not entirely, supported by the Federal government. Primarily we are economists and we make projections similar to those Dr. Arnold was telling you to regard with caution. However, we don't make them in the health manpower field. One of the things we've been doing a great deal of has been looking at the manpower implications of new national programs and new legislation. This accounts for much of our interest in health. I feel a little bit like a wolf in sheep's clothing or a sheep in wolf's clothing. Our interest in health comes from our interest in national priorities and the manpower needs we generate because of our spending for different national priorities. Usually, when we talk about national priorities, we think in terms of dollars, that is, whether we're spending too many dollars for defense or space and not enough dollars for things like health or rebuilding cities or education or what have you. Yet, dollars can be very misleading here because frequently the attempt to spend more dollars to achieve national objectives can be frustrated because of shortages of manpower or because of having poor systems for delivering the services. In many ways this is the case with health. If we look at the dollars spent, health as a national priority has been doing very well. Spending for health between 1962 and 1969 doubled. It went up from 31 to 64 billion dollars. This was about 25% greater than the increase in spending for national defense in the same period. So during the 1960's the dollars we spent for health actually grew more rapidly than the dollars we spent for national defense. As a share of GNP the comparison is also interesting. Between 1962 and 1969, if we look at a percentage of GNP represented by spending for health, this percentage increased from 5.6% to nearly 7% of GNP. If we look at national defense, spending for national defense decreased in this time about 9½% to 8½%. So in the 1960's, if we're looking at national priorities in terms of how much our global resources we devoted to them, the fact is that the share we were devoting for national defense went down somewhat, while the share we were devoting to health went up. Looking only at the spending side would make it appear that maybe we're going a long way toward achieving the goals of the Carnegie Commission's recent report, Higher Education and the Nation's Health, of providing adequate and effective care for the entire population, regardless of income. Yet, there's a whole array of problems and unmet health needs that would make us question the relevance of the dollar figures. For example, it is significant to note that in spite of the rapid growth in health expenditures, life expectancy for males in the United States is still among the lowest of all the industrial countries. To cite another statistic, according to a recent national health survey nearly three-fifths of the population had not seen a dentist in the preceding year. Furthermore, the 100% increase in national health expenditures reduces to a growth of a much lesser dimension after we allow for

price increases. Health care rose more rapidly in the 1960's than virtually any other component of the consumer price index. If we break consumer price increases into the cost of durables into the cost of things like food, rent and home expense, and then we take the cost of medical care, hospitals, physicians visits, drugs, the increase in the medical care components led in the consumer price index. So, between 1966 and 1970, on a per capita basis, health care rose at the almost fabulous rate of 11% a year. That is, each year in that period, on a per capita basis, we were spending 11% more for all kinds of medical care. If we subtract for the rise in prices for medical care, this 11% reduces to, I believe, something just short of 4½%. So most of the increase in the dollar spending for health care in the second half of the 1950's went into inflation -- into rising medical care cost, rather than greater provision of medical services. There are many reasons why medical care cost should be going up. For one thing, and this is really an improvement in service, medical technology is getting more complex. If we use complex equipment like kidney machines, then costs shoot up indeed. Labor costs have gone up. People like hospital attendants are no longer as badly paid as they used to be although they're still pretty badly paid. Then, financing arrangements like health insurance plans which pay hospital bills as they are presented exercise little or no control over the efficiency of the service. These kinds of plans have a built-in inflationary bias. But manpower enters into this. Between 1960 and 1968, if we look at the dollar, health expenditures went up by 110%. If we look at employment in the medical services industry, employment went up by 50%. Accordingly there has been a large increase in health expenditures and a far, far smaller increase in the manpower used to provide health services. Either this manpower is being used far more efficiently, or the technology is handling more of the medical services, or there's an imbalance between the growth in manpower and the growth in demand for medical care. Where does this growth in demand for medical services come from? And again there's no one cause. Population grows. This means more people want medical care. Income levels rise and educational levels rise. As people get better educated and they have more money, one of the things they buy a lot more of is medical care. Health insurance plans have expanded. This adds to the demand. But the biggest single item in the growth in demand for medical care has been expenditures, largely government expenditures, intended to bring medical care within reach of needy and high risk groups. The elderly and the poor are the prime examples. In the second half of the 1960's about three-fifths of the growth in spending for health has represented government spending. Our social conscience, our values, and the political pressures have stimulated us as a nation to enact legislation such as Medicare and Medicaid, but the same social conscience and political pressures have yet to be translated into a comparable effort to increase the numbers of doctors or dentists or nurses or medical technicians, or into efforts to significantly expand more effective systems for providing medical care. So we hear a great deal about manpower shortages, and I would agree with Dr. Arnold, there are many problems in interpreting what these shortages estimates mean. But to quote one source, which is, I believe, an excellent source in this area, Dr. Roger Egbert, Assistant Secretary of the Department of Health, Education, and Welfare, about a year ago indicated we needed 50,000 more physicians, a couple of hundred thousand more nurses, and almost 150,000 more technicians. Just what the basis of these estimates are, I don't know. Shortages of manpower in the health field are of special significance now because the economy is in a period of recession. The overall unemployment rate last month was 6.1% and the unemployment so far in 1970 has been about 6%. We hear and read, for example, about unemployed

engineers, about unemployed scientists or about how difficult it is for people coming out of graduate school to get college teaching positions. Yet here we have the area of health which is still characterized by acute manpower bottlenecks. In fact, it's the largest single area of the economy in which manpower shortages rather than manpower surpluses right now are the big problems. This can be looked at in many ways. Looking at it as an economist, the shortages are symptomatic of a fundamental supply-demand imbalance. Looking at it from another perspective, in human terms, we can say that in health, as in other areas, institutions are unresponsive to human needs. We hear a great deal about this in education. The students complain that courses lack relevance. Or we hear the same thing about Congress, that Congress is unresponsive to the needs for rehabilitation of the cities, or to the widespread demands to end the war in Vietnam. We hear frequently that our system of justice is unresponsive to changing needs. Courts lag way behind in handling their case load, most criminals don't get convicted, etc. The same thing is true in health in the sense that the system doesn't respond adequately to the rapid growth in requirements for its services.

What about the future? Will our society continue to press for large scale increases in demands for medical services while providing far lesser increases in the supply of health manpower? And this brings up the question of projections. Perhaps a good point to begin here is to quote a statement I've become very fond of from the American philosopher, Whitehead. It runs something like this. "Seek simplicity, but mistrust it." I would say the same thing about manpower projections, or about economic projections generally. They can be very useful in indicating bench marks to look for in the future. What would happen if expenditures for health, let's say, were to go up by 50%. Or they could indicate the consequences of a major change in government policy. For example, if government defense spending were to decline sharply, what would this do for employment? Or if the government were to run a deficit next year, how might this affect the unemployment rate? And so manpower projection can tell us alternatives and things to look for in the future, but they are not predictions. This is true of both manpower projections and I might add of projections of stock prices also, as people who were ~~in the stock~~ market in 1969 and 1970 frequently found out.

We have prepared a series of projections of manpower requirements in connection with the book that was mentioned, Manpower Needs for National Goals for the 1970's, and they include projections in the field of health as well. These projections are based on the idea that by the mid-1970's people would be receiving a level of health care roughly comparable to that provided by the most comprehensive health insurance system at the time we were doing the research, about 1965 and 1966. To this we allowed expanded dental care which was very rare then in the health insurance systems, and psychiatric care which was also seldom covered. We attempted to translate these expenditures into the utilization of health manpower. I don't want to reproduce a lot of numbers, but what interested me most in the estimates was that the lesser the degree of formal education, the lesser the degree of skill, the greater was the expected increase in requirement. The percentage increase estimated for doctors was 63% in the 1964 to 1975 period. For professional nurses, the percentage increase was 84%. For the practical nurses, licensed or not, we came up with a percentage increase which was happily just 100%. Then we went to the other end of the health manpower status system. For aides, the orderlies, the attendants, who are far and away the biggest group, our percentage increase was 144%. But overall figures

such as these, of course, obscure many of the problems, and they do so for a variety of reasons. One is because they are based on trends of the past, they tend to minimize the options for change. That is they build in them the delivery systems of the past. Now I don't think those delivery systems will disappear by 1975, I think they will be very much with us. However, if we concentrated more on change in health delivery systems, we might come up with somewhat different numbers. And then the overall figures obscure the whole problem of distribution of health manpower. In the mid-1960's, for example, there were 171 M.D.'s per 100,000 population in the Middle Atlantic states. This included states like Pennsylvania and New York and what have you. But then if we go to what is known as the East South Central region, that is, states like Georgia, Alabama, there were 71 M.D.'s per 100,000 population. If we had data on nurses and dentists, I believe they too would show significant problems in the distribution in health manpower. The problem of distribution occurs in different parts of the country and also within the same city. Within large cities if we shift from the relatively well-to-do to the low income areas and look at the distribution of M.D.'s, we get some very startling results. M.D.'s in private practice make up a strong case. In New York City on the affluent East Side there was one private doctor for every 200 persons. But then if we went into the low income areas of New York, particularly the nonwhite areas, in many of these areas there was one doctor for every 12,000 persons. That is one doctor in private practice. And again we've got to interpret these figures. Many doctors who have their offices in the more affluent areas serve patients from a much broader range of the city. The poeple in these very low income areas get much of their medical care not from private doctors in private practice, but either from clinics, hospitals, community health centers, etc. But the differentials are so big that the differences still indicate a very serious problem of distribution of health manpower.

Our projections are roughly similar to those of the Department of Labor which anticipate a need for an annual average of approximately 20,000 physicians a year for growth and to replace attrition losses. In the late 1960's, the nation's medical schools were graduating something greater than 8,000 physicians a year. The deficit has been made up partially by the utilization of doctors from other countries, and increasingly by the use of less highly trained persons to perform many old and new duties in the health field. If we go in many of the large hospitals of our metropolitan centers and we look at who the residents are, very frequently in places like New York, these residents are doctors from other countries. Personally, I think it's a reasonable guess that many of these other countries, particularly the developing nations, will tend to discourage this loss of doctors. While it is to their interest to have a doctor spend a few years in the United States, it's also to their interest to have him return. Implementing the recommendations of sources such as the recent Carnegie Commission report to build a number of new medical schools and shorten the period of medical education could increase the number of doctors in the next few years, perhaps by as much as 50%. But I think it is a reasonable guess that more than ever before the bulk of the increase in medical services in the 1970's will be provided either because of greater reliance on medical technology such as automating laboratories for medical tests, by expansion of things like group health and community health centers and by far greater utilization of people other than physicians and professional nurses -- either physicians assistants, technicians, hospital attendants, practical nurses, community mental health aides and similar personnel. This would appear on the surface to both provide a way of meeting these requirements and also providing employment in socially important human service occupations to the frequently unemployed young and to the unskilled and disadvantaged. There has been

much hope that this would be the case. But I'm sure you're all familiar with the barriers. Low earnings, high turnover rates, licensing and certification barriers and the frequent absence of career ladders in so many of these nonprofessional health occupations. To cite one instance hospital attendants are just beginning to enjoy the coverage of the national minimum wage laws. In most states, they are still barred from the benefits of the workman's compensation laws and the legal guarantees of the right to collective bargaining, guarantees which cover private industry very largely and have done so for about a generation. They still generally do not apply to health workers since health workers are typically employed by public and nonprofit organizations. And I recall a few years ago as part of the "War on Poverty" there was a great deal of interest in what was called "new careers," and it was felt that the largest single source of these new careers was in the health field. It was widely believed that as we use more and more nonprofessionals and subprofessionals in health, the opportunities for generating careers for people without formal training and building in opportunities to acquire skill and using their familiarity with the community and providing for upward mobility would be very good. But the same obstacles have been the big obstacles with the "new careers" group. It was just the past year or so that the national minimum wage of $1.60 an hour, for example, was applied to the health workers. If a head of a family of four was one of these new career types, and say he was working and getting the national minimum wage of $1.60 an hour, if we worked a full work year, that is 2000 hours, he would have earned $3,200. According to the Social Security Administration, the government's official poverty standard in 1970 was about $3,900. So the hospital attendant or community mental health attendant who was earning the legal minimum wage would have earned about $700 less than what the U. S. Government regards as a poverty income for a family of four in cities. So the big problem here in terms of attracting large numbers of people into these nonprofessional occupations at the bottom is a problem of earnings. It is also a problem of job security, mobility, dignity and opportunity for achievement and so forth. My own feeling is that until the story is changed significantly, the potentials of developments like the new careers movement which potentially are very good, are unlikely to be realized.

I think these manpower considerations and the general drift of the discussion tell us about one of the big strategic variables in the health field and that is these problems tend to have two dimensions. One dimension that runs through this is a technical or perhaps even better yet a technological dimension. Another dimension that runs through this whole area is a political dimension. To some extent trying to figure out what our health manpower problems are going to be or the health delivery system is going to be is like an engineer trying to figure out how to build a bridge or like an aeronautical engineer a few years ago trying to figure out how to design a space ship. These are questions of means and ends, of the most efficient of the least cost way of building a bridge that will meet certain standards of weight of protection against the elements of safety and so forth. And you can look at health manpower from that perspective, from the viewpoint of efficiency in meeting changing needs. But what we do in national health expenditures and what we do in terms of our health delivery systems including manpower is also likely to be a very important issue in the political debates of the next decade. It is for this reason, I believe, that John Veneman, Undersecretary of the Department of HEW, was quoted in the press earlier in the year to the effect, "That health is going to be the major political issue in the next couple of years." Now I suspect that what

Mr. Veneman means, and I don't really know, is that health has become very much a question of national priorities. What we do about our health manpower system follows from what we conceive our priorities in health to be. And of course this comes up again first in terms of dollars because what we spend for health, particularly with what the Federal Government spends for health, competes with spending for defense, competes with spending let's say for the cities, or for highways, and also has a way of competing with private consumer expenditures for higher living standards because public health expenditures usually mean higher taxes. And the development of new health manpower programs is very dependent on the Federal Government's grant system. And how far reaching the changes are which these dollars encourage to a very considerable extent depend on the Federal Government's budget priorities as they reflect the values and the goals of the administration in power.

What about the current proposals to expand health care? Will they continue the experience of the 1960's of giving people a lot more money to buy health, but having a slow growth in the dollars available to increase the supply of medical manpower and facilities? It's a little hard to give any definitive answers. There are a number of proposals before Congress. One is the administration's national health insurance plan which would primarily operate through the private insurance companies. We don't have any very good figures yet, but preliminary estimates by some government health planners with whom I spoke several months ago anticipated that enactment of the administration's health insurance plan would increase employers and employees spending for health insurance by about 6 maybe 7 billion dollars a year by the mid-1970's, and of course, this would be very largely translated into spending for health and medical care. The largely government-financed health insurance for the poor and other new measures are estimated to add maybe 1.4 or 1.5 billion dollars a year in addition to what is being spent in other programs. There are other proposals around such as Senator Kennedy's national health insurance plan which would have more far-reaching increases in Federal Government expenditures and more far-reaching implications for how health is financed, for what health delivery systems are, and how health manpower would be used. The administration has stated that it will present recommendations to control medical care costs and health manpower legislation within the next few months. The President's Health Message indicates a strong awareness of the supply-demand problems. But the measures in the national health proposal of the administration to increase the availability of funds to buy medical care would amount to billions of dollars. But the programs aimed at increasing the supply of medical services are of a far lesser magnitude. The administration's plan stresses the role of prepaid group practice systems, the health maintenance organization as a means of lowering cost and increasing the availability of medical care. The estimated Federal support for these organizations would amount to about 45 million dollars a year and then the government would underwrite private loans of up to 300 million dollars. This would be largely seed money for planning or to establish new centers. Spending for the allied health occupations percentage wise would increase substantially, but I think the total would be about 29 or 30 million dollars a year. Maybe the biggest single change is the expected 60 million dollars a year in these capitation grants for medical and dental students. Another innovation would be the 15 million dollars that's supposed to be devoted to training physicians' assistants. These expenditures would often represent new and important beginnings as in the physicians' assistant program or they'd represent substantial expansion of what we had done before. But are they anywhere near commensurate with the scope of the problem? And do they promise to redress the imbalance that makes for inflation, that produces this fundamental imbalance between supply and demand in the health care field? These are easy

questions to ask and hard questions to answer but I think one thing comes out of this and that is the yardstick for appraising progress toward achieving health goals in the 1970's will look at what happens to health manpower and to the systems providing medical care as much and even more than it looks at what happens to the dollars we're spending for medical care.

BEST COPY AVAILABLE

Dr. Kenneth Smith is an Assistant Professor at the University of Wisconsin, Department of Economics. Dr. Smith received his Ph.D. from Northwestern University and has been with the University of Wisconsin, Department of Economics, for the past two years. He is involved with several things there -- namely, two interdisciplinary institutes within the University. One of these is the Health Economics Research Institute and the other is the Social Systems Research Institute. Dr. Smith's primary interests involve the teaching of economics theory and some research in health economics. What he is going to discuss today represents his first major step into health manpower issues. He has also been interested in health maintenance organizations, particularly with the problems of entry. His presentation today will discuss a micro-methodology and the disaggregated data requirements for analyzing physician productivity.

A MICRO METHODOLOGY AND THE DISAGGREGATED DATA REQUIREMENTS FOR ANALYZING PHYSICIAN PRODUCTIVITY

By
Kenneth R. Smith, Ph.D. and Fredrick L. Golladay, Ph.D.
Research Economists
Social Systems Research Institute
University of Wisconsin

The Motivation

The rapidly expanding demand for medical care precipitated by the concept of medical care as a human right is imposing a substantial additional burden on the American health care system. It is imperative that methods be devised that increase the supply of medical care services. Expanding the number of physicians trained can only be a partial solution. Reorganizations of the current medical care delivery system which improve the overall efficiency of delivering care can also help alleviate supply shortages by increasing the productivity of presently practicing physicians.

As a response to the increasing patient care load faced by a limited number of physicians, some medical educators and practitioners have taken an active interest in task delegation. The last five years have seen a variety of proposals and programs for increasing physician productivity through the use of physician extenders. These programs reflect the conviction that physicians spend a great deal of their time performing routine tasks which could be performed as well by someone with less training than an M.D. What needs to be determined is which of the physician's responsibilities require his breadth of scientific background and clinical expertise and what types of allied health workers could assume responsibility for those tasks which are repetitive in nature. Unfortunately, while it is apparent to practitioners and observers that the present system in many situations requires excessive preparation, there is no agreement as to what constitutes the appropriate training for workers performing important medical tasks. To date, the role of new allied health workers has been defined through surveys and informal soundings of the profession. Several leaders of the medical profession have suggested a more systematic study of the activities of the characteristic medical practice. A comprehensive analysis of the production of medical care would be expected to reveal which activities are repetitive and to indicate the feasibility of delegating part of the responsibility of the traditional physician to new health workers.

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A system of medical care delivery that utilizes physician extenders has profound implications for health manpower planning. The production of medical care services is dependent both on the quantities of various inputs available and on how these inputs are organized. The technical opportunities for substitution among various types of medical personnel will affect what form the future investment in health manpower should take. Projections of future manpower requirements and the implied educational targets must consider the potential impact of reorganizations of health care delivery and redefinitions of the roles of health workers on the future needs for various classifications of personnel.

This paper describes the micro methodological approach that we are utilizing and the data that we are gathering at the University of Wisconsin's Health Economics Research Center in order to analyze the potential gains in physician productivity that can result from optimal utilization of allied health workers. The next section considers the questions that we address. Section III discusses a model of the primary care office practice that we employ to answer these questions. Section IV describes the data needs of the study and the efforts underway for developing this data. Section V compares our methodological approach with traditional attempts to determine the demand for new allied health workers. A final section summarizes our research effort.

The purpose of our study is to explore the implcations of employing new allied health workers in delivering primary care. We wish to provide some tentative answers to the following questions. First, to what extent can the supply of medical services delivered by an individual practitioner or a group of practitioners be expanded through efficient utilization of paraprofessionals? We need 20,000 new physicians a year and yet we are only producing 8,000. Increasing the productivity of the traditional physician is clearly an alternative to increasing his number. Thus, we wish to determine by how much the supply of medical care can be increased by making presently practicing physicians more productive.

Second, what will be the effect of efficient utilization on the net revenues of the practice or, equivalently, how will delegation affect the cost of providing medical care? A critical issue is whether the optimal program will be accomplished by substantial incentives to its fulfillment. In the present context, the issue is one of whether delegation is sufficiently profitable to encourage the use of the new allied health workers.

Third, how will potential gains in physician productivity be altered by legal, sociological, or technical restrictions on the opportunities for delegation assumed in the study? Some might suggest that certain tasks cannot be delegated. We wish to know how such a restriction will affect the gains in physician productivity that we identify. If there is a way of determining the extent to which restrictions limit the gains in productivity, then we place a cost on the restriction. Identifying the foregone opportunities that result from restricting the pattern of delegation may lead to pressures that ultimately break the more costly restrictions down.

Fourth, how will the size of the practice influence the pattern of tasks to be delegated and hence the skills that assistants should be provided? It may well be the case that a group practice can utilize an assistant more efficiently than a solo practice. There has been considerable discussion in the literature of what is called "returns to scale." Large practices are thought to be more efficient than small practices. While this notion has been accepted by many, it needs to be systematically and critically examined.

Finally, what will be the demand for specific types of paraprofessionals if tasks are efficiently delegated? This is a particularly important problem for health manpower planners. They need to know what types of health workers and how many should be trained if we are prepared to assume that physicians will delegate tasks optimally to new health workers that are made available to them.

The Methodology

These questions are being examined within the framework of an activity analysis of the medical practice. The purpose of the analysis is to simulate the behavior of an efficiently run practice under a variety of conditions where delegation is permitted. The model seeks to determine the least cost program of staffing and delegation required to produce the medical services demanded by patients in a representative practice. The solutions to the model illuminate questions regarding the optimal role of new health workers like the physician's assistant and indicate the implicit demand for categories of medical personnel in an economically efficient health care system.

The behavior of the model is constrained by two sets of considerations. First, the model is required to satisfy the medical demands observed in a characteristic practice. Second, it is required to produce medical services by some method which is known to be satisfactory. In general, there are a number of equally satisfactory ways to address a particular medical demand; each way is distinguished by the amount of time of the physician and each allied health worker involved in producing one unit of the service. The model regards the physician as a necessary attribute of the practice. Thus, the problem reduces to selecting methods of care which use the full-time physician and his staff as efficiently as possible.

The demands for medical services and the available techniques for delivering care together describe feasible alternatives facing the practice; that is, they indicate the choices among methods for satisfying well-defined patient demands. The model is operated by minimizing the variable costs of operating the practice. Since the physician is committed full-time to the practice, his interest is assumed to lie in minimizing the cost of hired labor required to meet the demands of his patients. At very low levels of activity he is expected to practice without assistance; however, as the scale of the practice increases, he is expected to hire those medical workers who will enable him to serve his patients at least cost. The demands for specific medical services are represented throughout the analysis by a vector of percentages of total visits accounted for by each service. Expanding the scale of the practice, therefore, entails increasing the number of visits per week while preserving the percentage distribution of services. This feature of the model gives rise to one of its more appealing attributes. By expanding the scale of the model practice, it is possible to examine the new patterns of staffing employed as the number of visits increases. Parametric programming, which in effect multiplies each element in the vector describing the composition of demands by a constant, then recomputes the optimal staffing and costs, permits one to investigate the relationship between optimal staffing and size of practice. At some scale of practice further opportunities for delegation will no longer be available, indicating that larger numbers of patients cannot be served by a single physician and any combination of allied health workers. This exercise thereby identifies the maximum productivity of a single physician.

The model may be used to analyze the questions outlined above. The most obvious issue is the potential effect of introducing physician's assistants into the health care system upon the productivity of the physician. This question may be addressed by contrasting the results from the model when the P. A. is and is not permitted. Excluding the P. A. eliminates a number of techniques for delivering care and hence reduces the flexibility of the practice. The difference in the solutions when only traditional personnel are employable and when P. A.'s are also employable reveals the potential additional visits that may be produced if the P. A. is optimally utilized.

A second issue of considerable interest is how does the optimal pattern of delegation relate to the size of the practice. By parametrically expanding the scale of the practice one may determine the optimal pattern of staffing for all feasible scales of practice. Each time the practice is reorganized in order to increase its efficiency, a new solution indicating the amount of time each type of worker should be employed and the techniques of care that should be used may be obtained.

A third issue which may be investigated with the model is the implications of restrictions on the use of P. A.'s in the practice. By deleting from the model any techniques which are prohibited by law or by medical custom, it is possible to assess the loss in productivity resulting from the restrictions. The results of the model with and without the restrictions indicate the effects of restraints on delegation.

In addition to addressing the issues described above, the model also permits one to explore the implications of alternative techniques for delivering care which have not yet been observed experimentally. Proposals to delegate specific tasks could be incorporated in defining the feasible techniques for delivering care.

The solutions to the model in each instance indicate the preferred or most efficient technique for delivering specific types of care. Since these techniques are expressed in terms of the different combinations of staff time necessary to produce a representative unit of some service, the chosen techniques indicate the specific functions being assigned to each person in the practice. In short, the model reveals the optimal task breakdown of activity for each member of the health care team in an efficiently operated practice. The solution, therefore, provides considerable guidance in identifying the skills that each member of the health care team should have. This information should facilitate the planning of training programs for allied health personnel.

These observations do not exhaust the possible ways of using the model. They do, however, convey the diversity of policy-relevant insights that may be derived from analyzing the solutions of the model. Most importantly, they indicate how an examination of the optimal role of allied health personnel might be incorporated in a survey of health manpower needs and training requirements in a rational health care system. This contrasts vividly with the vast literature on health manpower planning which relies upon the historically observed ratio of health manpower to population in projecting future manpower needs. The weakness of the traditional approach is obvious--it fails to explore the potential health manpower pyramid. In view of the extraordinary costs of establishing and of operating medical schools, this is a fundamental criticism.

The Required Disaggregated Data

The research strategy we are employing while extremely fruitful imposes considerable demands for disaggregated data. The study requires extensive detailed information on the potential technology of medical care, the composition of the bundle of medical services demanded and the probable costs of various allied health workers. Surprisingly little empirical research has been devoted to the activities of the primary care practice. As a result it has been necessary to undertake a study of a sample of general practices designed to provide a detailed profile in terms of tasks performed of the medical services presently being produced.

The technique of work sampling has been used to compile detailed data on the task content of a general medical practice; the time expended on each of 263 tasks over a two-week period has been recorded. The observers were second-year medical students who were trained in the analysis of general practices. By noting the person who performs each task, insights into feasible patterns of delegation and the time required for non-physician and physician personnel to perform each task are also obtained. The potential for delegation is investigated by including practices that employ new types of allied health workers. It is important to have the physician profile defined in terms of tasks performed rather than conditions treated because it is in terms of tasks that we can consider alternative ways of providing a particular medical service. At the same time, it is important to know how frequently each medical service has to be provided since the opportunities for delegation vary for different services. For example, the delegation opportunities differ between the performance of a physical examination and the undertaking of various technical diagnositic procedures. Thus, if we are to determine the impact of optimally utilizing personnel we must know whether in a week's time the satisfaction of patient needs involves the performance of fifty physical examinations and ten technical diagnostic procedures or ten physical examinations and fifty technical diagnostic procedures. The potential gains from delegation would quite likely be greater in the former case. As a final ingredient, it is necessary to know the probable costs of different types of allied health personnel.

Alternative Methods of Analysis

The present study provides a powerful approach to the analysis of task delegation and of manpower requirements in the medical care industry. The difference between this and the traditional approach can best be seen by considering the alternative ways in which the demand for physician extenders can be determined. The potential short-run market demand for specially trained assistants has been estimated in previous studies by determining the number of physicians who are willing and able to hire them. This method of estimating demand is undesirable in that it is highly dependent upon a particular specification of which tasks are delegable. In order for the physician to respond to the inquiry he must be presented with a description of the assistant in terms of the tasks he is likely to assume or, alternatively, know himself what is the optimal pattern of delegation. Yet this is one of the most controversial aspects of the study. There are wide variations in cultural conditioning as to what a full-trained physician is expected to do and differences in opinion regarding the amount of training necessary for performance of various tasks. As a result, it has been impossible to arrive at a delineation of delegable versus non-delegable tasks which is universally acceptable. It is undesirable that estimates of potential demand be contingent on one particular delineation or on each physician's own delineation of delegability.

It is our objective to generalize the analysis to investigate combinations of assistants which may not have been employed in any experimental setting. With the basic data on the patient demand for a larger number of tasks it will be possible to derive estimates of demand for variously defined physician's assistants, by including certain tasks in their "job description" in one case and excluding these tasks in other cases. Our method of deriving demand for assistants from the current level of output of various services will enable us to be flexible in assessing new manpower training in different locations at different times.

The present study reveals the gains in physician productivity that will be derived from efficient use of physician's assistants. By providing quantitative estimates of the increase in net revenues from the practice, the study should encourage efficient use of assistants. The result, therefore, indicates the potential long-run demand for assistants if all profitable opportunities for delegation are exploited; it assumes that physicians will be induced eventually to delegate if such delegation is profitable. This approach is conspicuously more appropriate than survey methods of demand estimation, since surveys depend crucially on the physician's perceptions of opportunities for delegation and on the definitions of assistants with which he is presented.

Finally, by specifically identifying the tasks performed and the various techniques of performing them our attention is focused on the training-utilization link. The optimal configuration of skills can be rationally examined. Furthermore, the analysis clarifies for both physicians and other medical personnel what their roles are and emphasizes the efficient utilization of all health personnel including the physician himself.

Summary

The motivation and substance of our approach to medical manpower problems currently being considered can be summarized by noting that a substantial response to the problem involves increasing the productivity of highly-trained physicians. At present, the health care industry is top-heavy with many highly-trained professional personnel and few mid-professional-level workers. We might envision an alternative medical care delivery system with a high level of specialization--tasks being performed by persons with "appropriate" levels of training. Unfortunately, there is no agreement as to what constitutes the appropriate training for workers performing important medical tasks.

The benefits from task delegation to medical care delivery are apparent. The pattern of training and of utilization is less obvious. The purpose of this study is to make more precise the idea of "appropriateness" in training paramedical personnel and to derive quantitative estimates of the impact of efficient delegation on the productivity of physicians and the health care industry. The study recognizes that at some cost any task performed by a physician could be delegated to a less highly-trained health worker. The issue, therefore, is what tasks can be efficiently delegated. To answer this question one must examine the opportunities for employing persons specialized in a few tasks and the implied cost of obtaining quality medical care.

Leading off this afternoon's program is Dr. Robert J. Mowitz, Director of the Institute of Public Administration here at The Pennsylvania State University. Dr. Mowitz received his Ph.D. in political science from the Maxwell School of Citizenship and Public Affairs at Syracuse University. From 1948-1964 Dr. Mowitz was on the faculty of Wayne State University in Detroit, prior to coming to Penn State. Some of his experiences include: service on advisory committees to state and local governments and to national, state and local health agencies; consultant to the economic adjustment advisor in the Office of the Secretary of Defense 1961-1969; member of Gov. Shafer's Little Hoover Commission for modernizing Pennsylvania state government; and directing the project which established the planning, programming and budgeting system for the Commonwealth of Pennsylvania. Currently he is assisting the State of Michigan in the development and implementation of its PPB system. He is the author of numerous articles and books in political science and public administration. This afternoon Dr. Mowitz will discuss the effects of information systems on manpower planning decisions, resource allocation and requirement setting.

EFFECTS OF LARGE INFORMATION SYSTEMS ON: MANPOWER PLANNING DECISIONS, RESOURCE ALLOCATION, THE SETTING OF MANPOWER REQUIREMENTS

By
Robert J. Mowitz, Ph.D.
Director
Institute of Public Administration
The Pennsylvania State University

I was in East Lansing a week or two ago making a speech at Michigan State University and bumped into a former student. He said, "What are you going to speak about?" I said, "Didn't you read the program?" He said, "Yes, but you never speak on the subject of the program." I didn't disappoint him. Maybe I'd better read you the new title I've given myself. It's consistent I think with your purposes here. I would like to talk this afternoon about "The Effects of New Types of Governmental Decision Systems Upon the Health Services System," with particular reference to setting of manpower requirements for planning and program decision purposes. That sounds like a good title. I'll see if I can deal with it.

First of all, I'd like to talk a little bit about the general characteristics of these new decisions systems; then talk specifically about the kind of decision logic involved by them and forced by them; and then approach the question of setting manpower requirements. If we have the time or the inclination we can apply it specifically to the health services field. By way of introduction I should say that the kind of work which the Institute and I have engaged in for the last four years has dealt with whole systems and design of these decisions systems for statewide programs. Health is only one of the major programs we've been dealing with within the whole gamut of statewide programs. Health is a subset, a major one. I think we can show what the implications are for health per se.

I'd like to identify what I think are the major characteristics of these new decisions systems. I think these have particular relevance to you. First of all they are research-oriented and information sensitive. This is somewhat different from the past kinds of decisions systems we have had for government. A second characteristic they have is a focus upon effects of organized effort as measured by changes in behavior and in the environment. By that I mean their focus is not on what government does, but on what happens as a result of what government does. Consequently the major measure, the major numbering system if you like, has something to do with the characteristics of people and the environment, rather than the characteristics of the government or governmental personnel per se. Third, they require a constant flow of information concerning the nature of the environment in which the organization functions and the effect the government has upon that environment as well as information about the work or activities that go on within government. These are really two sets of information. They imply different types of information and carry different meaning as I shall make clear, I think, as I go on.

The design of these systems has been under way for a long time and they have been called various things. I suppose you could argue that the first systems approach to governmental decision making was in Plato's Republic when he tried to deal with the system in terms of different types of personnel. More recent efforts I suppose would be indicated by the first budgeting legislation we had in Federal Government after World War I. Performance budgeting, program budgeting and various terms have been applied to it. The Department of Defense came up with a "new" system in 1961, called Program Package Budgeting. Then, in the middle of the '60's Lyndon Johnson in a rather unfortunate press conference, said that the Federal Government was going to adopt a new, mysterious and magical system called PPBS that would solve all our problems and make us all happy at a reduced cost. In spite of some of the clumsy rhetoric that's gone on within this whole area, the effort to introduce more sophistication into the governmental decision making process has been an ongoing one for a long period of time. It probably required something like the computer to come along, creating a capacity to handle masses of information in different ways. It probably also required a general recognition that instead of living in an open society or open universe with unlimited resources, that populations as well as physical masses grow and crowd up on us, bringing us closer to a situation in which zero sum games and opportunity cost have to be considered in all decision making. I don't think that man adopts rational approaches to decision making because he's rational. I think he adopts them when he has no other choice. Part of the incentive for going in the direction I'm talking about today is probably due to the fact there's a growing recognition on the part of all large industrial states with large urban centers that our capacity to govern is virtually nonexistent. Whether we'll recapture that capacity to govern is questionable, but if we're going to do it, we're going to have to make some significant changes in the way in which we deal with decision making in the governmental system. We're going to need a different type of information base if we're going to make decisions that have much meaning whatsoever. That's in a sense what I'll be talking about and that's what I have in mind when I use such terms as "The Effects of New Types of Governmental Decision Systems Upon Health Services Systems." To the extent that health is in the public sector, it's going to be affected by this. Since a good piece of health is in the public sector, and probably a growing piece as far as payment of health services are concerned, it's inevitable that to some extent the characteristics of the health services systems will be determined by what we're talking about today in terms of governmental decisions systems.

I'd like to begin by spending a little time on the basic logic of the types of decision processes we're talking about. We've talked a good deal about the problem of setting goals and objectives. In fact, we've had legislation now that established some kind of a phenomenon called the Comprehensive Health Planning Agency at state levels and substate levels. Presumably if we have all of this planning for health decision making we solve some of the problems having to do with setting of goals and objectives. The words "goals and objectives" get batted around something like the words "law and order." I don't know which comes first -- objectives and goals or goals and objectives. In any event they are something that must be done if we're going to design some kind of decision system. The kind of decision logic that I want to talk about today also deals with goals and objectives. To over-simplify I'd like to explain what the implications are as we move from broad statements of what we'll call values/goals/objectives to specific statements about work performed. Any kind of a decisions system has to be bounded by values if it's human beings doing it. The values, we'll have to admit, are the kinds of things that any given human system wants. You can only express them in words --

good health, a happy life, meaningful leisure, etc. The words express values in the system. We all know what they are. We feel about them. We feel strongly about them.

Down at the base of the decision system, we know a lot about something else. We know a lot about work. We know what people do. They're busy. They arrive at 8:00 a.m. in the morning, they leave at 5:00 p.m. at night, they do something. Whatever that is they do, they get paid in terms of dollars. Presumably, when they get through being paid for it there's something out here we call output. If we're lucky, we can find it. When you add up all those things that people do (which is work) and put it up here at the values/goals/objectives level you get happiness, good health, meaningful leisure, etc. So the trick is quite simple. Or is it? Governors and Presidents feel strongly about what ought to happen at the value/goal level. When they aggregate their budgets and put all the dollars together they even have a feeling that they're doing something about values and goals. Thus they say they're putting 70 billion dollars into health education and welfare, 100+ billion into national security, etc. They even have the feeling that if they move some dollars from one program to another something happens in terms of happiness, health and security. The presumption that they're making, of course, is that there's some kind of a direct linear linkage between what happens up here (value/goal/objective level) and what happens down here (work level) and therefore when they get through people are happier, healthier, educated and what have you. If someone were to come along and do a simple analysis it might go thusly.

Since the mid-'30's when we started public housing projects until the end of the Johnson administration in 1969 we have spent more money in urban renewal, slum clearance, and public housing than ever before. Therefore, we would assume that the number of acres in central cities which would be classified as slums fit for urban renewal or in a decayed condition would be diminishing. Right? Wrong! They are increasing! You may infer from that, of course, that the more we spent on it the worse off we were. Well, you can't have it both ways you see. If all the budgets and dollars decisions up here at the value/goal/objective level are correctly based on the assumption that something happens down here with work, then the two opposing curves wouldn't occur as in the urban renewal example. Well, this is all a kind of leisure domain that has nothing to do with reality anyway. It's a very interesting shadow game. It's like Plato said that when you're facing the wall and the fire's behind you and you see the shadow, well, what's the difference anyway? Once you get used to shadows, you can enjoy them. Much of our budget decision-making is playing with these kinds of shadows and much of the encouragement of the bureaucracy is to reimforce the figment of the imagination that the shadows are real. Who is doing all this work? The one thing we know is that the money appropriated was spent. That we can agree on. Whether the work occurred or not, we're not so sure, but at least we know expenditures were there. We have a General Accounting Office to make sure. It audits very carefully to make sure that the expenditures took place. I only have to give this lecture for more than three seconds to the average Governor before he's out of his seat pounding on the table saying, "You're right!" I dealt with both Republican and Democratic governors, and all could be considered fairly liberal. I don't know of a single one who wouldn't give his eye teeth to be able to say that I did something up here (values/goals/objectives) that made something happen down here (work done) and know it and prove it. Then he'd feel as if he were governor. But if it's only a random relationship between what he does at the value/goal/objective level and what work activity occurs down here, who's governor? Who's President? Do you think Nixon wants 6% unemployment? I doubt it. Well, if decision making up here about values,

goals and objectives, moves something down here which you call work, but doesn't make anything happen out here that you want to happen, what do you say. There must be an economist in the room. It's good welfare economics because at least you're reimbursing people to do the work. They make a living out of it and they do pour money back into the society. It's a higher elevation of work than WPA, and probably has no greater benefit or deterrents than WPA. I may be stretching the point. The point I'm trying to make is that if we're going to somehow design a decision logic that gets around this dilemma, how do we do it and how do we get around it? Is it possible to do it? I'm not sure it's possible to design the system. I'm not sure the solution exists in the state of the art. I'm not sure there is a state of the art in public health, for example. I know there's a lot of work here in the health field. I'm not sure what the state of the art is as far as the public health is concerned if we mean by that work having to do with the rest of the system. At least when we deal with work we deal with things we can all "feel."

Returning to our decision system, we have at the base, manpower, material, and a lot of dollars. All this you can see. At the top are the values, goals and objectives expressed as words. Now how do you link the two together? One level is numbers, the other is words. There's somthing lacking in this system. Let's go back to the words, goals and objectives. If we start by defining goals as being something very subjective, never provable in any sense, something people agree it's a good thing to be, such as healthy, theoretically we could design a system where non-health is a good thing. Life on earth is misery, therefore, the shorter the better. Thus one would design a system to maximize a quick death and at the same time having enough population around to have quick deaths. It's possible to do that, but we don't. We want to move to the next level to develop some numbering system. Let us say we have defined goals. Now we will look at the work objectives.

We begin to define objectives in terms of characteristics of people or behavior and characteristics of things (which can be natural or man made) which we want to happen, in real time and in real numbers. Let's look at the difference. Let's say that we're talking about an environmental health program. We all agree that a certain level of dirt in the air is probably bad. We don't really believe in "clean" air, I think that's an abstraction you would all immediately agree with. Therefore, we mean some level of dirt. We know what is done down here (work) in laboratories, what is done down here (work) by inspectors, we know all the things (work) that go under something called Air Environment Program. But really what we want to manage against is some characteristic up at the value/goal/objective level. In this case, some kind of characteristic or number of pollutants or particules in the air. Or it may be some other number which describes the characteristic in the environment. Now how much we spend down at the work level is relevant only as long as it has a direct relationship or creates some kind of an impact up at the value/goal level. Let me put it another way. If we define education of five year olds in terms of characteristics of children when it comes to recognizing symbols, that's something that we want to create. We don't want to create teachers. We don't want to create classrooms per se. We want to bring about a condition in human behavior that meets certain characteristics. As long as there is a direct causal relationship here between the work and what happens, it's fine. We're in business. But if there is any doubt or any probability that this is not a direct relationship, then we're in trouble. Because then the amount of money that we spent at this level (work) may have no relationship to what happens up at the value/goal level. We're back with the Governor of Michigan or Pennsylvania who

says, "My God, I've been supporting money for urban renewal all during these years." Governor Williams for ten years was pushing for it in the State of Michigan. When he got through, Detroit had the best riots in the United States, not because he was intent on creating a situation that would encourage riot. He took the advice of all his experts. He built mental hospitals the way he was told to. He structured health programs the way he was advised. In fact, if there ever was a governor who bent over backwards to listen to his experts, it was Governor Williams. Now what's happened? I can assure you that what's happened as is true in most areas of government services is that we've had a simulated relationship here of a causal relationship between what the work is and what happens. There is a doctrine in education which tells us that if we have so many teachers trained in certain ways, certificated in certain ways, with a certain teacher-pupil ration for various types of classrooms, something happens. Therefore, if children are not educated you need more speciality teachers, a better teacher-pupil ration, or more money, because the educational system doesn't have enough of what it wants. If people are not healthy in Detroit, it's because we've never had enough public health nurses. You've never had the number specified, you see, so you've got a safe argument. The point I'm trying to make is that if you design a decision system where the first number against which programs will be judged is up here (value/goals/objectives level), then when we get down to the work level we are now dealing with <u>outputs</u> of work. Some mix of those outputs optimally would have the best possible influence upon achieving the objectives. If the whole information system is designed to juxtapose this kind of information with what we're now doing here in terms of work, the mere fact of juxtaposition begins to present a framework for examining the plausability of the inference that there's a causal relationship between what we do at the work level and what's happening to goals and objectives. In many cases this is a rather shattering juxtaposition.

Now I hope you follow the implications that I'm talking about because it's at the goals/objectives level where you establish your manpower requirements. In establishing a manpower requirement for any particular program you are in essence making this statement: We know that if we define the product of the work of these people and assemble it in some way that we would call a program element, that will produce a number of outputs of work which when aggregated or added up will give a certain amount of change in the environment. That is the focus of manpower planning that this type of decision system introduces into the system. It does not begin by saying, "Do we have enough people?" "Do we have enough public health nurses or enough physicians?" It begins by asking the question, "What do we know about the relationship between the amount of effort at the work level and the characteristics at the goal or value level?" Before you can answer that, how can you even begin to specify what a manpower requirement is. You are wasting your time. Whenever you say there's a requirement you're making an assumption that you know the relationship between the work and what affect it will have on the thing you're trying to condition. Will more police produce more law and order? The doctrine would tend to assume that there is some relationship there. Will more police produce more safety on highways? Well, we've done some tests and when you reduce the police it doesn't seem to have much effect one way or the other. Do you feel better with more cops around on the super highway? Maybe. Maybe they do other things like first aid. Maybe they mop up after an accident, but you don't really need a policeman to do that. Maybe you need a plastic surgeon or a hearse, or just a wrecker or something else. Did the crime rates go up? Do they always go up when you change the intensity of patrol? Sometimes they do, sometimes they don't. The point I'm trying to make is that our doctrine has given us the assumption that we have the kind of information that permits us to specify how much we need and what kinds of manpower we need to do certain things. And I'm saying in those programs of government having to do with human services, we know

very little. We know an awful lot about how much concrete it takes to make a highway. We know a lot about the comparative benefits between asphalt, different types of aggregates and things like that. We have a lot of doctrine in these areas. We also have all kinds of doctrine about the effect education in prisons has upon the job behavior of prisoners after they leave the prison. Controlled experiments testing that doctrine reveal that the amount of education which goes on within correctional institutions has no appreciable effect upon whether or not a prisoner gets a better job. In fact, it has no influence upon it whatsoever. We may still want to conduct educational programs for some other reasons, but the doctrine saying this has something to do with reducing job turnover is nonsense.

Some states already are developing a total decisions system which includes information about all programs organized in relation to goals and objectives. They also are building in a reporting system which is an information system which reports at the objective level. It requires that you specify target impact (the target is what the bureaucracy says it intends to do) and then it reports actuals in terms of experience. These systems also include three kinds of information at the work level. These are output (which is program information), financial (information that is the mix of resources that go into any particular component of work), and the one that interests you in this conference, manpower. In other words, the point at which the manpower information fits into the system is where you are making the program judgment that the work carried out by these individuals will produce the results predicated in the objectives statement.

Now, how do you arrive at the proper module or quantities of work to relate it to the effects that the work has. We have a vast amount of experience which tells us how to relate work to output. We can get all sorts of time motion studies and more sophisticated studies which will make sure that the inspector inspects the most number of spots in any one week or any one day. You can do traveling salesmen studies on his routes to get the optimum mix of inspectors and so on. However, what is critical is what is the relationship between the inspections and the quality of the air. We'll never know how many inspections we need unless we can establish that relationship. Or the mix of activities which involves inspections on the one hand with perhaps some educational program on the other hand or some research or some changes in the mechanics of flues or something else. At the level of work the program analyst is looking at a mix of modules of work and manpower is in order to bring out that change in the environment-reduction of air pollutants.

This approach to decision making in Pennsylvania was introduced with one governor and it's now survived the change in governors and it has stuck. Nothing is more creditable than having been able to survive two governors! The new budget document is out now and if you look at it I think you'll see my point. Another major state is engaging in it too. Now what are the implications? Immediately this has implications for civil service classification systems. How do we recruit manpower and specify classification now? Historically, this is what happened. I went through this in the Commonwealth of Pennsylvania. We look to schools as civil service people have done in the past, and say, "What is a program analyst?" Let's look at your curriculum. Pretty soon you specified the whole curriculum. That's what a program analyst is. Therefore, to become classified as a program analyst, you go through this curriculum and are then classified as a program analyst. So classification systems have always reinforced the worst in the educational system. The one way to guarantee the success of your program is to make quite sure what the whole certification system and education are all about. Does

a woman with a master's degree in education teach better? Maybe she does and maybe she doesn't. I'd have to look. I'm not sure. I'm not sure what teaching means anyway. As taught, maybe she does teach as taught better than someone who was not taught to teach the way she teaches. What effect that has on children's behavior is something else again. You can end up you see with a self-serving, closed system where you never can lose. Not only that, but since you never produce enough, you can always say we need more. And they're right. I would say the system is smarter than the professional training because the fact that people don't go into some of these fields is a sensitivity in the system that they are non-fields; there's non-work.

I had a hypothesis that people never went into health education because it's a non-existent field. So whenever they got out into it they were unhappy and the first thing they try to do is get out of it. No one would see if he had no role or mission which was right. Our teachers said we ought to do this but no one else recognized that.

We have a lot of people in many professions where the same thing is happening. Immediately what you begin to do under this system is to look at a different type of manpower specification. We can find some of this action in civil rights. Some of the prodding along this line we've been getting from minority groups helps reinforce some rationality in the setting of requirements. This historic way to set manpower classification systems and manpower requirements is much like a specification code in the building and housing inspection field. We specify what we want. For example, to be a program analyst you must have 15 credit hours of statistics, 20 hours of this, and so forth. If you have all those specifications you qualify. By contrast under a building performance code the criteria are: joists so far apart, a specific kind of plumbing installed, so many electrical outlets, etc., then you meet the qualifications for a safe house. You also meet the requirements of the local contractors and the unions to make sure that buildings are well built from their point of view.

Under a performance code system, you say I want to hire somebody who can do regression analysis. I don't really care where he gets the education but I care whether he can do it. In fact, I <u>can't</u> tell whether he can do regression analysis if I read his transcript. Reading his transcript is the least informative way to find out what he can do. I'll only find out how he's graded. Even if he can't do regression analysis under a specification system, he says, "But I qualify!" If I <u>first</u> ask him whether he can do it as under a performance system, I don't even have to hire him. Educational institutions are going in this direction. For example, the State of New York, in cooperation with the Carnegie Report, is setting up a regents degree. They'll give a bachelor's degree regardless of where or how you get the knowledge. If you can pass a set of examinations and have all the characteristics of what a person with a bachelor's degree has, you get a bachelor's degree. The question is whether you can meet the <u>performance</u> criteria. That pattern is increasingly going to occur because every state in the union as well as the United States is going broke in a way. Big cities have already reached the point where each new increase means either cutting back on new positions or laying people off. The most dramatic illustration was in Dearborn, Michigan. The Supreme Court of Michigan forced the Mayor to increase the salary of the firemen. The Mayor sent letters to some 50 or so people which said in effect, "Because these greedy people in the Fire Department insist on so much money, I have to fire you." That's what he said. Public officials have to make decisions in terms of what is doable within the range of what the government has in resources and power.

The same is true in public health. We have more public health than ever before and the rate of drug addiction is going higher than ever. Is this a health problem? If it is and if we have a battery of knowledge and a shopping bag of skills which we've developed over the years, I'd say that they are rather blunted arrows because obviously they're having no impact whatsoever. It appears that we're no longer depending upon rational men to bring about this kind of a change in decision making, we're just depending upon desperate men. And that's a gamble. The confidence in our ability to apply social science to solving social problems is becoming less and less. We have 30 years, that's the mid-'30's right through the great society almost, to prove the conflicting curves. And we're not going to solve the problems by doing more of what we did before with newly unleashed money. Poor Lyndon Johnson, he unleashed it like a flood and it just swept him right out. I'm not talking about the war in Vietnam alone, I'm talking about the poverty program and Federal aid to education. All these were massive breakthroughs in the mid-'60's yet the educational system is worse now than it was in '65, and we've spent more federal funds on it in the last five years than in the history of the United States. Yes, it's right! If we have anything in our social and behavioral science to bring to bear upon these problems then it seems to me we're going to have to do it very rapidly. The kind of decision structure that I'm talking about does in fact at least introduce life into the mirk. It does begin to juxtapose what is now our conventional doctrine (our common sense or just folklore) about what we do and what happens. Beginning to know where your ignorance lies is probably the first step toward finding out what you might be able to do. Also the system does provide an opportunity to experiment. You have to think about public decision making as an ongoing experiment, not as the application of what you know. If you've been out of school for ten years and are not aware of what the recent research findings are, you're probably out of date already. Now what that means to manpower requirement setting is difficult to say. Certainly it's going to change. We're going to have to change civil service classification systems. And we will. We're going to probably get closer to the performance type of specification rather than the old specification code which relies on amount of education to define what a person can do. To arrive at that we will have to know more about what has to be done in the way of work in order to bring about the effects we want. I don't think our education system yet is systematically doing it. I don't know of a major university that's not re-evaluating its undergraduate curriculum right now and in a sense the whole logic is aimed in this direction. You were brought up with a specification code. An A.B. Degree or a B.S. Degree with those hours specified. Right? And the assumption was once you had them you had whatever it was you had to have to do what you wanted to do to succeed. Does it still have to operate this way, or will the new decisions systems offer more rational alternatives. And on that high note, I'll end.

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Continuing this afternoon's consideration of health data and health information systems is Mr. Royal Crystal, Director of the Community Profile Data Center in HEW. Mr. Crystal has a long history of experience in administration, planning, research, and statistical activities in the health field both in and out of government. For six years he served as Deputy Branch Chief and then as Branch Chief in the Public Health Service Health Economics Branch. From the mid-50's into the '60's he gained considerable experience working with Blue Cross-Blue Shield plans in various capacities. He holds a Bachelor's degree from Quinnipack College in Hamden, Connecticut and a Master of Public Health from Columbia University. This afternoon Mr. Crystal will discuss the manpower data we have versus the data questions we need to ask.

THE MANPOWER DATA WE HAVE VERSUS THE DATA QUESTIONS WE OUGHT TO BE ASKING

By
Royal A. Crystal
Director, Community Profile Data Center,
Community Health Service, Health Services
and Mental Health Administration, DHEW

I'm not sure that the title of my talk is exactly what I'm going to talk about this afternoon. As I looked at the subject, I found it was far more formidable than I had at first thought it to be, so I hope you will bear with me as I take some free license as between my assigned topic and what actually comes out. I think too, that I should begin by telling you that I'm not a manpower data expert in any sense of the word. Therefore, I'd like to phrase my remarks in the context of a user of information as well as a data collector, and as one who works with planners and policy people and perhaps can interpret some of the problems which they face in obtaining and using health manpower data. In the process I hope to give you a valid summary of the current availability of health manpower data.

As a form of introduction I'd like to make a few remarks about health manpower information needs from a planning perspective. The context of these remarks is essentially in terms of what information one needs for planning versus what one has to work with.

In the planning area generally we've come to the conclusion that there are nine broad categories of information which one needs to have to support the planning process. Briefly, these include the following: (1) Information about health resources and services within the planning area, including health manpower information of all types; (2) Measures of community health status, a type of measure which most of us admit is not readily available; (3) Measures of health service utilization, again the type of information which is partially available, but often not nearly as complete or detailed as one would like to have for planning; (4) Information on the outcome of care and services provided by the resources in the community. (5) Measures of health services utility, a set of derived measures of how effectively the resources and services in the community are in fact doing the job which they say they are organized to do. (6) Information of all types on environmental quality; (7) Socio-economic and demographic information about the community. (8) Information about community development, as it is evolving now and how it may evolve in the future. (9) Information about the cost and financing of health services at the local level.

At least four of these eight categories of information are directly related to personal health services, and running through each of these data categories is a manpower component, if one accepts the following premise: no health service can be provided without manpower, no facility can be operated without manpower, and there can be no effective outcome of a given modality of treatment unless there is adequate manpower to provide the service. Thus, manpower

is the key and perhaps the most important factor in health planning from many standpoints, excluding of course, the so-called political factors which are unrelated in the context of these remarks. If one accepts the given that health manpower is the key factor in planning, the question then arises, what is the status of health manpower in the United States today? What information do we have about the availability of health manpower?

Generally, there is a great deal of information available on health manpower, as there is on many other aspects of health. Health manpower information is collected by many sources, the most common of which you're all familiar with. Unfortunately the available manpower data is deficient in both quality and utility in many respects. In a sense there is no coordination of health manpower data collection in this country today. Some of the information which is collected is fairly adequate from the standpoint of the collector, but not really useful from the standpoint of the ultimate users, those who must do health planning.

The best health manpower data which we have relates to the accepted major professional categories, physician, osteopaths, dentists and nurses. We have fairly complete and fairly useful information in these four areas, but even here the data are not totally acceptable since the time lag between collection and availability may be several years.

Given that as the positive end of the spectrum, deficient as it may be, the absolutely worst data which we have in the health field today, in my opinion, is in the area of paramedical or ancillary health manpower. None of the information that's available is truly useful for planning, for analysis or for much of anything else. Just out of curiosity, I recently went through the manpower categories listed in the National Center for Health Statistics Volume, Health Resources Statistics and found that there were some thirty-five categories of health and ancillary personnel. Out of these thirty-five categories only three were adequately covered, if we consider physicians and osteopaths as a single group. Thirty-two out of thirty-five categories of needed health manpower information were not complete enough for use in in-depth analysis or detailed planning. That's a pretty poor track record!

A few comments about the sources of information. Most of the health manpower information that we have one way or another comes from the major professional organizations. The American Medical Association, American Doctors Association, American Nurses Association, and American Osteopaths Association are the major collectors, but there are also the various professional groups which represent each of the other disciplines. Under the best of circumstances there are many problems with this multiple collector approach. First, the information that we obtain from these sources lacks completeness in the sense that not all members of the profession are members of the organization. Therefore, there is a potential built-in deficiency relative to universe completeness of surveys. Second, there's a major time lag between collection and release of data in almost all cases. (I believe we're still using 1966 data for at least one of the major professional categories, nursing, and 1967 data for one of the sub-nursing categories (LPN's).) Even in the best cases the data are at least a year to a year-and-a-half behind. Third, there's the problem of under-reporting in that not all members of the surveying organization respond to questionnaires. Fourth, even if there was complete information provided by all of the members of each

organization who were surveyed, information about the practice location of these people and their professional status is essentially incomplete and incorrectly asked for planning purposes. This, then, is an overview of the poor status of health manpower information in the country.

The best sources of manpower information are and will probably continue to be state licensure agencies. In every state these are the primary and potentially most consistent sources of information. What's needed to make them truly effective is the development of regional and national systems to obtain information from licensure groups on a continuing basis, to manipulate that information and to make it readily available to all of those who have a requirement for manpower information for planning, analysis and operating purposes. At this time there is no such system in complete operation anywhere in the country. There are bits and pieces of systems; several in the mid-West are quite good. Others are developing, but none is yet complete.

An additional question that comes up in looking at information needed for planning, especially in the manpower area, is who can best do what in the manpower field given all of the disparate collection efforts; good, bad and indifferent. The question is, who should have what piece of the pie for what purpose- who will be responsible for what? Certainly the Federal government, state government and local governmental units all have the capacity to obtain manpower information from many sources, and all voluntary planning groups, however constituted, obtain information. Unfortunately there is no master plan.

It is our philosophy in looking at information needed for planning that the best and most detailed collection of health manpower information can be done at the state and local level, in accordance with a broadly coordinated effort. Parenthetically, this is also where most of the detailed information is needed. The procedure which we advocate is for the health planner to obtain the best summary date which is available from various national sources and to merge it with information obtained locally, with the level of detail and the degree of completeness which he feels is required. This merging and matching of information and the use of multiple sources fits closely into the partnership for health concept and certainly in the manpower area, perhaps more than any other, there needs to be this type of partnership.

I think that we can assume it is possible and indeed necessary to establish viable health manpower data systems. Assuming that such systems will be developed, what are the planning questions which they must help us to resolve? Our work with planners indicate some nine basic questions, or areas of interest. (1) The obvious question, how many types of manpower and how many of each type do we have in the area for which we're planning and where are they specifically located? (2) What are the levels and categories of specialization and type of employment of each category of manpower in our area? (3) Are all of these personnel really available to serve the community or are they reporting themselves present but in fact not available to provide care and services? (4) What is the training level, and age of the health manpower in the area? (5) How many practitioners are approaching retirement age and are in fact not providing full service to the community although they are present? This is the kind of information which is critical for local planning. (6) Information on the capacity to which the manpower in the community is working and may be capable of working. To say that we have enough physicians and yet know the community is going to be expanding raises questions about whether the existing manpower are in fact going to

be able to provide the additional necessary service for those who will require them. The question is essentially, do we have either a functional shortage or an absolute shortage in manpower. (7) Looking toward the future, one needs to know how many of what types of personnel are going to be needed and at what point in time they are going to be needed so that plans can be developed for the training and attraction of appropriate manpower categories to the area. (8) Information must be available about the potential sources of recruitment and what the availability of manpower is going to be in the future. (9) Information must be available about potential changes in demand for service and possible utilization of health services in the planning area and the potential effect of new modalities of care. This will directly affect future manpower requirements and the types of manpower which may be needed in the community.

I believe it may be helpful to place this discussion on a more positive basis at this point. If one looks broadly at the manpower data question, he finds that it is really not much different from looking at the problem of health data in general. Health data has been said to be about the worst type of information which exists in this country today. I think that that is a fair statement. There are indeed many other health data problems, besides those of manpower. All of you who are here today are concerned with manpower problems. We must remember, however, that there are sets of comparable problems in the areas of health facilities, utilization, and demand and need for services. Beyond this, there are few good time series of health information; not just relative to manpower but in almost all areas. There are problems of definition, and there are problems caused by varying collection methodology in all areas. Finally, there are a whole range of compatibility problems. Given the scope of these many problems, we often have a basic inability to do even the most elementary types of record linkage and to fully analyze the health situation in our communities.

From the standpoint of those who are going to be in or are already in the health data collection area and the health planning area, several of the most frustrating things are the decisions about which data sources to use and how to analyze the data. One way or another, you're wrong no matter how you approach these problems. You may pick too much information or too little information, recognizing that both too much and too little may both be unsatisfactory. From a planning standpoint, the guideline would be to pick exactly the amount of information one needs to have to take a first look at the area for which planning will be done, and then later build a much larger information base and expand activities based upon the original analysis.

I think that a few words about the role of the planner versus the role of the data technician may be in order. First it's hard to be a purist when one talks about a planner or a data technician. Data experts frequently think they are planners and planners almost always know that they're experts in health data. The latter position is usually incorrect. Data is a full time job. The planner can't do his job without good information; rarely have sound plans been developed without good information. Further, the planner cannot be the data expert unless he wants to drop out and not do any planning. I frequently think that this is what some planners are trying to do.

The planner needs to think about the issues, the problems, the options, and the questions and to decide what types of information he needs to have to

his decisions. The data expert also needs to think about these questions if he is to effectively advise the planner. He should obtain the necessary information for the planner, prepare it and provide easily understood, concise analyses. Concise, easily understood analyses are always needed but all to infrequently prepared. A cardinal rule for the planner is that he must keep the data expert on-board and remember that data collection is a continuing task, not an on again, off again type of activity. Finally those in planning need to remember that good data isn't cheap. One doesn't just go out and obtain information. The data expert must have resources to back up the collection and analysis projects.

In summary, what's needed is a true data partnership between collectors and planners, recognizing that in the health data field we've come a long way but still have a long way to go. Unless we have correct and complete information and apply modern technology to its analysis, planners will never be able to consider planning options and alternatives in a complete manner and make rational choices. Too often today our choices are based on irrational analysis and unproven supposition. I, for one, think we've had enough of this process.

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I am pleased to introduce our dinner speaker tonight, Mr. David B. Hoover. Mr. Hoover is currently Associate Director for Program Planning and Administration for the Division of Allied Health, Bureau of Health Manpower Education, National Institutes of Health Mr. Hoover has attended Johns Hopkins University, the Universities of Maryland and Michigan, and holds an M.P.H. from Harvard University.

Mr. Hoover speaks from a base of some twenty years of experience in health agencies, both voluntary and governmental. He has held a variety of statistical positions in several states and in several federal agencies. The last seven years of his career have been spent directly dealing with health manpower issues and data problems. He also has been Project Officer to the Foundation's Health Manpower Intelligence Facility Project and is well qualified to address the subject of "Decision-Making in Health Manpower."

DECISION-MAKING IN HEALTH MANPOWER

By
David B. Hoover
Associate Director for Program Planning and Evaluation
Division of Allied Health Manpower
Bureau of Health Manpower Education
National Institutes of Health

Within the Federal Government, the Bureau of Health Manpower Education is the focal point for support of the specialized education and training of health professionals. A primary mission of the Bureau is to provide funds for the continued and expanding operation of these programs. A number of trends, which are well known to everyone acquainted with the field, make Federal assistance for this more necessary and appropriate every year. The knowledge explosion in the health field, the gloomy financial prospects for private educational institutions, and increasing reluctance to use medical care fees for educational purposes are three that come immediately to mind.

A second mission of the Bureau is to improve the efficiency and the effectiveness of the educational process. A great deal of our work has to do with such things as curriculum reform, the integration of separate but related training programs, and the development of audio-visual materials. These efforts will make training more relevant and, hopefully, less costly.

A third major mission is to stimulate work force changes through changes in the types of persons trained. This includes not only training new types of health workers, but also and perhaps more importantly, adding new elements to educational programs to stimulate existing types of workers to serve in new and more effective ways.

For the year beginning in July 1971, the Bureau will have about $540 million to accomplish these missions. This is not as large a sum of money as it at first appears to be, when it is balanced against the many educational needs that surely must have a high priority if our health system is to meet its current challenges. Of course, there are other Federal programs that support health manpower education and training. An inventory of these programs for 1970 showed that 145 of them provided approximately $1.1 billion for this purpose. Ninety-four of these programs were exclusively for health manpower training. Many of them pursue policies designed to change the characteristics or distribution of health services to be provided. Many attempt to establish new educational and employment opportunities in the health industry for selected population groups. The health planner, then, and especially the health manpower planner have in Federal programs some useful tools with which to effect changes in the systems with which they deal.

Using these tools, however, requires enough knowledge to cut a clear path through the Federal program underbrush; it also requires enough understanding of the dynamics of health manpower to perceive relationships between manpower

policies, broad manpower strategies, and ultimate effects upon the health care delivery system. This, I suppose, is much of what this conference is about.

It is obviously foolish to try to describe these 145 programs here. However, it may be of some help to discuss the types of programs that exist, and why there are so many. There are five general types:

1. Programs which provide general support for the education and training of health professionals. Most of these programs are concentrated in the Bureau of Health Manpower Education. Their primary mission is to assure continued operation of health professions schools.

2. Programs which provide support for education or training in a variety of fields, one of which may be health. This includes the Office of Education programs that support higher education in general, and the OE-Department of Labor programs for vocational education.

3. Programs which provide training for or assistance to various special categories of students and workers -- primarily the disadvantaged.

4. Programs which support research and development in health occupations education and training. These programs either (1) support innovations in education in connection with experiments in the delivery system, or (2) merely address the problem of training the types of workers we now have in a more efficient and effective manner.

5. Finally, service or regulatory programs of the government may also provide or support some training for health workers, when this is deemed necessary in order to reach program objectives. The training is usually quite specialized, and may be offered only to employees of Federal, State, or local governments.

In addition, the Government conducts or supports other kinds of manpower efforts, not education or training, such as the setting of standards, the development of proficiency examinations, the equating of academic accomplishments with experience and knowledge gained on the job, and attempts to understand the behavior of health manpower -- how it responds to opportunities, incentives, constraints, and external social and economic forces.

To this audience, I should stress that the Bureau of Health Manpower Education includes, in addition to the categorical Divisions of Allied Health Manpower, Dental Health, Nursing, and Physicians and Health Professions Education, the recently formed Division of Manpower Intelligence. There are a number of representatives of this Division here today. This Division worries about what and how much manpower we have, and how much we need. Given sufficient time and resources, it will become a source of data, techniques, and general assistance for health manpower planners and analysts throughout the country.

We have been increasing the proportion of our Bureau budget that is allocated to planning, analysis, and research of the health manpower "system" (as opposed to educational programs, which are only one component of this system). This money to "get smart" about manpower is still, however, substantially less than 5% of our total expenditures. Whether or not it should be 5% is, of course, a moot question. I don't know that anybody can say how much of an investment in dollars or effort is appropriate for health manpower planning and analysis.

There certainly is a tremendous demand for us to know much more about all phases of health manpower than we do know. As a matter of fact, if you try to list all the things that people want to know, you will run out of paper before you come to the end of the list.

Principally, however, the Bureau carries out its primary mission of support of educational programs through the allocation of funds to those educational institutions which are carrying out fairly traditional programs at the collegiate level. We spend most of our time talking and thinking about doing other things, but that is where most of the money goes.

As far as the augmentation of the supply of health professionals is concerned, it is difficult to say how much of any type of manpower we "need," either in the sense of economic demand or in the sense of providing adequate care. Under our present system of health care and in our present situation however, it is still safe to say that you can name almost any type of health manpower and find, taking the nation as a whole, either a deficit in the numbers who carry the label or deficits in the skill and knowledge of the people now doing the work. One way or the other, for almost all types of health manpower, we have training needs -- desirable, serious, or urgent.

One item of much current interest is the training and utilization of physician assistants. It is really remarkable that in the last three years this concept of a surrogate medical practitioner (which is really what we're talking about if we consider the eventual role of the most advanced types of physician assistants) has grown from something that was talked about informally, and principally by the more daring speculators among us, into something that almost everyone recognizes as theoretically necessary and desirable. I think that anybody who looks at the health manpower problem for very long will come to the conclusion that in the near future physicians, as they are now trained and practicing, are not going to be able to meet the demands for primary medical care without substantial conservation of their time and energy. This means increasing delegation of duties to nurses and allied health manpower, including duties still regarded as reserved to the practice of medicine. Some $15 million will be spent by the Bureau in the next fiscal year to explore the educational aspects of this question.

Another Bureau interest is promoting health careers. We look at health manpower from two different points of view. First, as a resource which the health system requires in order to produce an output. Then we turn the coin over and look at the health industry as a fertile field for solving employment problems. As an industry, we are expected to contribute substantially to meeting the needs for those who are currently underemployed, unemployed, or otherwise disadvantaged. Senator Kennedy has noted that the health industry is the "fastest growing failing industry in the country." It certainly is the fastest growing, and whether we like it or not, there is tremendous pressure upon the health system to provide substantial and rewarding careers for large numbers of people of types that, by and large, we now accord only the most menial status.

This is related to a fourth concern in health manpower, and that's the problem of qualifying people. In health above all other fields we seem to have an obsession with pieces of formal paper that say a person is fit to do the job he's doing. Even in the medical laboratory, which is an area where you can easily measure and control the quality of the output (which is all that counts),

we seem to be unable to bring outselves to face the fact that it is not really necessary to examine the academic credentials of the people doing the work. As a matter of fact, chimpanzees should be perfectly acceptable laboratory workers, provided that the output of that laboratory met high standards. But a demand for qualifications and credentials of individuals, and of accreditation for educational programs, is with us and is probably always going to be with us. Up to now the health unions and the traditionalist forces in education and regulation have been, in the main, satisfied with academic credentials as a measure of whether or not a person is fit to do work. There are obvious disadvantages in this, in terms of limited career opportunities for people who have not had an opportunity to earn a degree, and in terms of the extra cost that you have to pay for someone who's overeducated for the job he's doing.

What we should think and do about this situation is the subject of much discussion. Something we can do is to develop additional objective methods of determining whether someone has the necessary theoretical and technical knowledge to do his job. If he does, then perhaps we can give him some kind of certificate or registration stating that indeed he does know something and we don't have to take his unsupported word for it.

The entire subject of regulation and control of health manpower is sometimes misunderstood. For example, occasionally one encounters the notion that new controls should be imposed in order to establish career ladders and improve the relationships between academic programs and job levels. This ignores the fact that controls are by their nature restrictive, not permissive (and the fact that new controls are invariably devised and promulgated by groups that are very conservative on this subject). It also ignores the fact that regulations do not provide the procedures by which the health manpower system can improve the rationality of its operations.

Some efforts are being made to examine the regulatory picture en toto. Particularly, a study under the auspices of the National Commission on Accrediting, led by W. K. Selden, is examining the educational program accreditation situation in the health field. (Since licensure and other forms of manpower regulation are so closely related to the quality of training of the individual, accreditation is a form of manpower control.) The point is that health manpower planners cannot ignore the constraints upon numbers or utilization, that are imposed through various control mechanisms. You should be generally familiar with trends in licensure, registration, certification, regulation via third-party payers, and educational program accreditation.

This is perhaps the place to add that there will be ever-increasing demands for more sophisticated analyses of health manpower supply and requirements. We also will need closer examination, on a quantitative basis and in a "systems" context, of the policies pursued by governments, professional associations, educational programs, and employers. Referring again to the particular concerns of the Bureau, we see that the most efficient use of training funds requires flexible support mechanisms rather than a slavish doling out of funds to a limited list of eligible recipients. This flexible support requires, however, that each educational activity proposed for our support be demonstrably necessary or desirable, with respect to local or national manpower requirements or both. An increasingly analytical approach to program planning is necessary, especially on the part of educational institutions and the State and regional organizations from which they seek endorsement. Without more rigor in the health manpower planning process we could spend quite a bit of that $1.1 billion in ineffective ways.

This conference has been discussing a number of different aspects of the manpower problem, but they all involve "analysis." Analysis is the resolution of something that is very complex into simpler elements according to assumptions of the moment, to predict what the complex structure will do, or simply to show how it reacts.

There are three basic types of analysis: logical, statistical, and systems. Economic analysis is sometimes given as a fourth basic type, since it involves elements of both statistical and systems analysis and, I suppose, because its practice is uniquely frustrating when predictions are required.

Logical analysis is dealing with concepts, symbols, and categorization. It is what we are doing when we sit down to determine what, for a particular project or study in mind, is "health manpower." What is it that you are talking about? What can be left out of the totality of your concerns of the moment? Can you generalize about your subject matter: does it come in groups, or are you faced with several million individuals with little in common that is, for your purposes, significant?

In health manpower, we see analytical activity of all of these types being carried on. Most of our problems, however, are down at the logical analysis level. We don't even have a common language for analysts to speak. What do we mean when we say "health manpower," "health administrators," or "primary care personnel?" For that matter, what do we mean by the term "health?" Statistics are of little value if they refer only to such vague terms. Mathematical models are not useful tools if they do not incorporate key factors in the behavior of manpower. They can't at the moment simply because we haven't given enough study to what is governing the behavior of health workers, employers, and educational programs. We must agree on what we're dealing with, how we classify it, what names we attach to it, and what constitutes a rational approach to its study and eventual management. In the next few years, I don't see that we will be making much progress in the more sophisticated areas of health manpower analysis, for want of a logical base on which to build. Simply descriptive statistics of the work force, vacancies, and training programs will, of course, improve (and will keep us busy enough, at that).

I've been asked to say something about the decision-making processes in the Federal Government, presumably those of particular interest to health manpower planners and analysts. This is a difficult subject at best, since the processes are multiple and not clear-cut. I'm not talking about the decisions leading to approval or disapproval of individual manpower projects, decisions which are taken by external review committees and advisory councils. I assume that you are familiar enough with these, and more interested in the broad-scale decisions that lead to major investments along one or another policy line. An example would be what proportion of Federal support for health manpower will go into the production of physician assistants? The major types of decisions of this sort are those that, first, concern the appropriate Federal role, if any, in solving a problem. Secondly, budgetary decisions make allocations of Federal funds between competing programs: health versus facilities and services, health professionals versus health technicians. Thirdly, legislative and administrative policy decisions determine constraints upon programs. Fourth, regulatory functions are exercised with respect to health manpower, and decisions on the use of these powers are made. Finally, official or quasi-official stands are taken on matters, such as accreditation practices, in which government has no direct involvement.

As you can see, to attempt to discuss "the decision-making process" in a speech such as this is to be guilty either of gross oversimplification or of setting foolish and immodest goals. I prefer to be indicted, if at all, on former grounds.

In general, decisions of these kinds are arrived at through a kind of "dialogue by memorandum" that functions between higher and lower levels of the Government. Suggestions, in the form of budget or legislative proposals, are passed up from below. Suggestions and directives, in these forms, are passed down from above. More frequently than outsiders generally realize, there are opportunities to expand this dialogue to freely discuss possible new programs, new postures, and more effective ways of reaching national objectives. When you reflect upon it, there are a remarkable number of opportunities for minor cogs in the Government machinery (I count myself as one) to have some input into the thinking on major problems.

Reflecting a bit further, I'd like to make an observation that, in my experience, intellectual or bureaucratic arrogance is seldom encountered in this process -- so seldom that one becomes surprised to meet it. Certainly in the health manpower area, attempting to participate in policy formation is a humbling experience. Staff and advisory bodies alike are acutely conscious of how poorly we are able to foresee the future state of affairs, and the results of particular actions in this area.

Some points about this "dialogue by memorandum." First, the written expression of a proposal with brevity, clarity, and some degree of elegance is important to a wide hearing. Second, few new ideas surface at the first presentation: the dialogue within Government, in concert with communications between government and private groups and citizens, creates a climate for the acceptance of a new policy or program and makes the eventual decision possible or even inevitable. Third, the more responsible persons involved within government are generally acutely mindful of the public interest -- although how that interest is best served is not necessarily more clear to them than it is to us.

Finally, I should mention the type of decision, or allocation of priorities, that is taken in order to give greater visibility to a program or a problem, coordinate activities among several agencies. These programs, with acronymic names such as JCBS, CAMPS, WIN, CEP, etc. generally represent a realignment and reemphasis of existing activities as much as anything new and revolutionary. The public setting of an objective and a new program emphasis, often taken at the presidential level, is of course an effective technique, but it can be seen as an outgrowth rather than a part of the dynamic decision-making process that I've tried to describe so briefly.

Various tools to help this decision-making process are introduced from time to time. They have such names as "Program Planning and Budgeting System" and "Operational Planning System." They have two objectives: First, to give managers a better idea of the choices available to them, if possible, with a better notion of the consequences of those choices. Secondly, they may attempt to introduce greater accountability, so that an organization, not meeting some of its essential objectives, may have its feet held to the fire. Actually, they don't work very well, for reasons that will be obvious to you. There is simply not the knowledge base from which to manage health affairs with any sort of secure feeling. I think that health planners all share an uneasy feeling that the whole thing could blow up in their faces tomorrow, and that it wouldn't surprise them

much if it did. In these conditions, we can't expect much from better management techniques which must be based on an ability to not only predict but also influence future events in the national health system.

One thing that has impressed health manpower planners is that, without an identifiable organization that is responsible for making things happen, planning becomes just so much talking about planning. Who is responsible in this country for doing what in the health manpower arena? The Bureau of Health Manpower Education doesn't actually train people. Most educational programs producing health manpower are "voluntary" -- able to start up, expand, contract, or close down regardless of what planners may recommend. Who is responsible for seeing that there is an adequate supply of, say, occupational therapists in Pennsylvania? What authority could an organization be given so that it could accept such a responsibility? As long as there are no answers to these questions, what can be the result of all this manpower planning?

Yet we need planning, because we need more efficient utilization of our health care resources. Future demands for health care will be much greater than they are now. Approximately one-third of our population does not get the health care it needs. Reaching this "submerged one-third" will require greater efforts than most people anticipate. Although we are currently hearing that there are no shortages of specific types of health manpower in certain areas, this has to be looked at as an economic phenomenon rather than as the meeting of health care needs. And, of course, the economic picture can change overnight with the introduction of one of the national health insurance schemes.

There is much more to manpower planning than anticipating numerical shortages, however. If we are not more efficient in the training and utilization of health professionals, good health care could price itself out of the market. As salaries increase, as they are bound to do in this generally low-paid industry, we will emphasize the conservation of professional time through maximum utilization of lower level personnel, not as a method of overcoming shortages but as a cost-control device. Eventually, as health planners and managers, our job will be to find and implement strategies that will keep health care an affordable commodity.

There are some hard decisions ahead in the health field. For example, how much of our gross national product can we afford to spend for the well-being of non-productive members of society? How much of our resources should we plan to devote to nursing homes, mental hospitals, and life support systems for the very old as they pass from one life-threatening crisis to another? The potential for this type of investment exceeds any reasonable demand on the economy of even this wealthy country. Shall we ask you to undertake a cost-benefit analysis of this? Of course not, since there is no way to measure the value of the benefits. One thing we will ask you, as representative of health analysts and planners, is to become ever-better informed about how we are using our health care resources at a given time, and what are the possibilities of using these resources in different and perhaps better ways.

These resources include skilled manpower and the training activities that produce it and that maintain skills. "Conservation" literally means the "wise use" of resources. Conservation of health manpower is rapidly becoming, at long last, an important issue to the country.

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Dr. Peter Meyer is Assistant Professor of Economic Planning in the College of Human Development here at The Pennsylvania State University. He received a Ph.D. in economics from The University of Wisconsin and has been here on the Penn State Campus since 1968. Dr. Meyer teaches in the Community Development program and he is also Principal Investigator for the Public Assistance Standards Revision Project, in which he is developing new indices of poverty and standards for assistance for The Department of Public Welfare, Commonwealth of Pennsylvania. As Dr. Meyer discusses health manpower this morning he will be applying his general interest in cost-benefit analysis and its application in social economic policy-making. For portions of Dr. Meyer's presentation you will need to refer to hand-out materials distributed yesterday.

INSIGHTS FROM COST/EFFECTIVENESS ANALYSIS

By
Peter Meyer, Ph.D.
Assistant Professor of Economic Planning
Pennsylvania State University

One possible title for my intended topic this morning is "Inside Strong Cost Effectiveness Analysis." In a sense, if you remember what Dave Hoover said last night about four types of analysis - logical, statistical, economic and systems - I am trying to use some economic analysis to suggest possibilities and leads for the construction of the underlying logical analysis. This logic does not seem to be too solidly constructed in the health field and especially in the health manpower field, at this particular point in time.

Dealing with cost effectiveness or cost benefit analysis requires the development of some kind of a model or an abstraction from reality. Determining what can be abstracted, what are the critical variables to retain, and what variables and types of complications might be assumed away in order to develop a consistent measure for looking at a particular problem is a very, very difficult thing to do. I frankly do not know what is important and what is not important in the area of health. I can only speculate on possible ways in which we might utilize certain types of variables and on ways in which we might classify available information. Tables I and II are listings of possible variables for inclusion in models which might be built to address two different types of problems. We can use these examples to engage in the exercise of defining what constitutes the critical items and what constitutes the less important variables. The two examples provide for variables which can be used in the discussion of a wide range of different problems. You will disagree with some of the classifications constructed, you will not some naivete on my part with respect to health care systems, and you will feel that minor items are given careful consideration while major problems are ignored. In reviewing and refining these lists of variables and constraints for the models to be developed and analyzed, you will actually be criticising the models implicit in the lists. You will be rejecting some of my assumptions and proposing others. In essence, you will be working on the development of appropriate planning models for health manpower development and utilization. We can proceed step by step through the critique process.

A model can be defined as containing a number of different items. First of all there are variables. How many people do you have? How many people do you need? How much do they cost? What are you trying to accomplish? Next, some output measures. A set of variables that can be permitted to range over some discreet range of alternative values. We can't assume that tomorrow we're going to have five times the number of M.D.'s we've got today so there's some limitation on the range of the variables we permit ourselves to look at. Putting it a bit differently we have another set of variables which are not so much what exists or might exist or the types of things that we'd like to manipulate, but rather what we would like to have exist. These desires are our outputs. We have another set of variables. The constraints, such as what do we have? What can we afford to pay? How soon can we change the existing supplies? That is to say, how many years does it take to train what type of health manpower?

Now we could simply lump all these things as a set of variables subject to a variety of different types of manipulations. However, in trying to set up a logical framework for analysis we might find it preferable to construct our perspective in terms of a set of variables which are to be manipulated and among which choices have to be made in terms of utilization or task assignment. Another set of variables may be defined, which act as constraints on what the possible choices are. Now there are going to be times when what we're viewing as a variable to be manipulated will act as a constraint on another variable to be manipulated. There exist, therefore, two distinct functions, or roles if you will, for these variables. Next, there exist functional relationships, in the sense that presumably some combination of M.D.'s, R.N.'s and other types of health manpower will permit us to deliver some particular set of services. So those services are a function of manpower inputs. At this point we run into a wholly new set of variables:

To my mind one of the most interesting complications, and at the same time opportunities, that I have encountered with regard to health manpower utilization is the role of telecommunications now and in the future. For example, electrocardiograms can be sent over telephone wires to an individual who is an expert in analyzing the patterns. That is to say, it is not necessary to have experts geographically distributed throughout the United States. If one had an adequate communications network then the specialist in reading certain types of data output on patients could be serving from one physical locale a network that is actually nationwide. So the capital equipment (the communications technology, certain aspects of transportation technology, etc.) become critical factors in determining possible manpower utilization alternatives. The physical inputs into the functional relationships will change the possible amount of output for a given level of manpower input or combinations of manpower inputs.

The functional relationships are something which to my mind quite clearly require a health professional for proper construction. Together, we can try to discuss some of the ways in which we might treat aspects of manpower planning, the elements of some models of the health care delivery process, and alternative combinations of manpower utilization as limiting the possible cost effectiveness of health care. Utilizing the cost-effectiveness criterion stresses that the initial question to be addressed must be the most efficient way in which to deliver those health services that are now available. In addressing this question, we can determine what slack might exist in the existing supplies of health manpower. If we could provide the level of health care now available with less manpower or less highly skilled manpower than we now use, then we can address using existing manpower supplies in order to extend the health care currently provided.

The efficiency implications of attempting to assure that simple functions are not executed by persons with high skill levels can be illustrated quite simply. If, for example, the immediate response to a patient in a hospital were to come from the staff person nearest a room from which a call emanates, whether that person be a laundryman, food service employee or whatever, potential cost savings result. The employee could respond fully to a call for a bedpan, and could refer more complex requests to the staff with greater training. This procedure might reduce the need for L.P.N.'s let alone R.N.'s, whose time is partially dissipated by such functions. Interesting problems exist - for certain classes of patients even such rudimentary a service as bedpan provision may require skilled staff. There are some possibilities for identification of such cases, which might permit differential treatment. Thinking about such an alternative may enable us to contemplate a range of increases in efficiency which may result from utilizing

as hospital staff, persons who are currently viewed as totally tangential, but who happen to be on location in wards on a regular basis. Thinking along these lines constitutes the development of alternative health care models.

Implicit in the idea of a cost-benefit or a cost-effectiveness analysis is the assumption that one can measure inputs and outputs with a single variable that provides for complete consistency in comparison between two distinct approaches to the provision of care. A physician engages in a broad range of activities in providing services. The existing combination of activities in which a physician engages is partially a function of the manpower and the time constraints that the physician now feels. While we might increase the quantity of all of those activities, the resultant increase in quality might fall short of that to be derived from a different mix of activities, involving a lesser aggregate quantity increase.

There is a problem in taking the myriad different services or products delivered by a physician or delivered by a hospital, and trying to derive a consistent measure of what constitutes output quality or quantity. To try to measure output, one must have some sort of scheme whereby comparison of intensive care for a heart attack victim with the performance of a tonsillectomy, is possible. How many tonsillectomies equal a single reaction to a cardiac arrest? This is the problem that must be addressed. One might be able to come up with some data on cost of inputs that go into a tonsillectomy and the cost of the inputs that go into responding to a cardiac arrest. Next, one might be able to say that, since it costs, say, 17 times as much to respond to a cardiac arrest as to conduct one tonsillectomy, one cardiac arrest response is equivalent to 17 tonsillectomies. Such analysis simply looks at the cost of the inputs in so far as they are measureable. What is the value of the output? We still do not know. If a tonsillectomy is something that simply makes it easier for people to breathe and is in no way critical, while responding to a cardiac arrest keeps an individual alive, then the tradeoff is between 17 people breathing easier and 1 person breathing at all. I don't know quite how you handle that tradeoff. I suspect that the major problem in trying to do any planning in the health field is the absence of a coherent value system that can be applied to the analysis of such alternatives.

For example, if you assume that the cardiac arrest response is something that is provided to an individual over age 65 (We're intentionally picking someone who is "no longer productive.") and you assume that the tonsillectomies are all administered to children who have not yet entered the work force (and who, because some of them may be more productive having had the tonsillectomies than they would have been in its absence), then you look at the picture from a point of view of the contribution of health services to national productivity. Such an evaluation would clearly favor the tonsillectomies. But is that necessarily a desirable value system? Alternatively, I might suggest that the individual who has the cardiac arrest retired five days previously, after over 40 years of productivity in the American economy. Do you want to deny him his reward of leisurely retirement? That is in essence what you're doing by not responding to his cardiac arrest.

I suspect that, until some of these value questions begin to be answered by the society, you are faced with a situation in which coming up with a consistent basis for comparability is virtually impossible. It becomes a matter of the subjective judgment of the analyst in a particular instance. Activity analysis might avoid some of these issues. There remains, however, the question of to what extent the activities engaged in today are a function of the existing mix of health manpower and the existing pattern of cost. Given the patterns of geographic distribution

of certain types of medical expertise, we might apply some transportation and communication technologies that could allow us to use manpower far more efficiently. So if we just look at the existing activities and the existing allocation of effort and assume that we want to increase this, but not tamper with the mix because we don't know how to tamper with the mix, we again miss the boat. Apparently, cost benefit analysis is very useful: it defines the problem so as to make it quite clear that solutions are unavailable. Therefore, we can all go home.

Unfortunately we have to come up with some solutions and fortunately there <u>are</u> other insights from cost benefit analysis that provide more useful information. Last night, Dave Hoover made reference to the fact that with the data problems and the various conceptual problems that we have it is very possible that the only thing that we can do at this point in time is try to sequentially solve relatively small problems. Perhaps we can start to get some sort of physicians' aide program going, and then move on to something else. When you get pediatrics nurse-practitioners and nurse mid-wives and the like, you experience gradually changing work patterns. Now this is perhaps the only way in which the change can be brought about at this point in time, but I do think that we'd better look at the dangers of assuming that this constitutes a logical progression. Here, cost-benefit analysis may help us.

One particular change in the permissible role for an individual with a given level of education and training, let us say the extension of the R.N. into a pediatrics nurse-practitioner, changes the possible task assignments for a physician's assistant type A. This assistant, a sort of a lower level M.D., might actually take over a great deal of the pediatric work of a given general practice.

If there exists a pediatric nurse-practitioner in that practice, then the pediatric tasks will not be within the scope of the physician assistant. Moving sequentially, therefore, can be seen to change the possible roles for the next type of new manpower, or the next type of change in manpower assignments that will take place. It is, therefore, important to think about what's happening in terms of long-range time horizons, as the various sequential steps are taken. I am, of course, leading gradually into the incredible problem of time-phasing in trying to move from the existing health services to some future state that is deemed desirable, and to the concomitant mix of manpower for some point in the future.

If one new manpower type is introduced today as an expedient response to the politics of the various professional associations concerned with the health area, this shift may actually lock us into moving in a direction that, in terms of objectives for the year 1980, is highly undesirable. The implications over time of this kind of sequential move are very tricky and must be incorporated in decision making. Another way in which these sequential steps might be dictated is in terms of training time. The different patterns of training time currently constrain the rate and the pattern with which we <u>can</u> introduce new types of manpower or new combinations of manpower tasks. Training time is thus a constraint on the range of alternatives available.

We're basically faced with two problems, one of which is the provision of health care today and in the immediate future in the most efficient and efficacious manner possible. The other is the problem of the more distant future, say beyond the amount of time required to greatly change the number of M.D.'s such as 8 to 10 years. This future horizon may be viewed as a date at which virtually any health manpower supply mix is possible, given immediate action. (We run into a problem only if we want to, for example, quadruple the number of physicians. For that additional lead time is required for the medical schools

to engage in their capital expansion before they can produce that number of M.D.'s) So we have the immediate future, within the next 5 years, and the distant future, which is 10 years or more away. There are many types of manpower which could be trained over the next 5 years and who could become active in the transitional period from 5 to 10 years hence. We need to look at a sequential pattern but within a broader time frame. The immediate problem is improving health care as it exists today and more efficiently using the manpower that is available today followed by a transitional period as we start to move towards the patterns of manpower and task allocation which will be evolving in the future. The final segment of the pattern is the targets which become possible starting sometime around 1980-1981. This timetable assumes that changes started yesterday.

Time is a critical type of problem. I understand that there's a shortage of nurses in hospitals. I also understand that there are at least as many registered nurses in the state of Pennsylvania who are currently not practicing as there are practicing. Well, we've got an immediate problem there. How can we get the nonpracticing R.N.'s to start parcticing again? That might be the immediate issue which could be addressed. To my mind this issue is not one of health manpower planning. Planning is something that makes reference to changing potential future supplies, not just current possible supplies. However, in looking to the future, one must address the question of whether or not we can get some of those R.N.'s to start working again to help us through that transitional period. There exists the possibility that those "retired" R.N.'s have not worked for so long that to get them active again will cost too much money. Questions must be addressed: how long does it take to get them active again and how much does it take in terms of cost? These costs must be contrasted with those associated with no reactivation. The latter alternative may, implicitly, reflect lower quality health care over the minimum period required for training of new personnel. The result of the tradeoff is unknown.

I could talk about my unorthodox ideas about utilizing general hospital staff. Doing so would generate a focus on the costs and benefits of hospital personnel policies. Alternatively, we might analyze the cost-benefit ratio associated with each year of an M.D.'s training, or of educational policies for health manpower in general. Any examples, however, require a return to another question: What is the health manpower thing? What are we planning for? Are we planning for hospitals? Are we planning for public health? Are we planning for increasing the utilization of preventative care? This objective implies a configuration of manpower that is completely different from that which envisions a future in which preventative care, because of manpower shortages, is something that can't be indulged, can't be engaged in. The way in which the objectives are phrased is critical and very clearly involves some assumptions as to what is possible. You must have your own mental picture of what that evolving future or the desirable future is to begin to plan to create that future.

The very fact that you have a picture of the future inevitably affects the way in which you classify data and thus, the type of projection you end up making. And, if you will, the assumptions you start out with will end up affecting (I will not go so far as to say fully determining) your final product in terms of your final plan. Tables I and II are illustrative in this regard. The variables indentified reflect my views of the problems and limit the possible scope of analysis -- even before any functional relationships are specified. You could not plan coherently with the huge number of variables presented in the tables. In practice, restriction of the number of variables considered salient would further constrain the range of possible planning outcomes.

I saw a study of the patterns of remuneration of hospital manpower which identified 75 different types of manpower and subclasses within that. Table I exhibits a much smaller number of types of staff because I've tried to simplify. Now it may be that I engaged in an oversimplification. I may have made distinctions that do not seem to be important. Criticize my construction of variables and derive alternatives. This brainstorming is part of the planning process. What seem to be tenable assumptions and what assumptions appear implicit in the way in which Table I identified variables? Consider the following proposition:

> "Basically there's no distinction between volunteers and the types of things that they might do and what a paraprofessional in a hospital might do. Assuming that the volunteer has been around a particular ward for 1,000 hours of volunteer time, that volunteer is at least as capable as any paraprofessional. Possibly more so depending upon how long the paraprofessionals been around."

What assumptions are inherent? Are they tenable? What are the manpower utilization implications? Might not all non-specialized personnel on wards on a transitional basis provide routine help with meals and bedpans and the like? They may require rudimentary training. Training does not have to take a long and extensive period of time. Overspecialized personnel are costly, especially in the context of manpower shortages. Consider the variable labeled QUA in Table I; qualification criteria for service, maintenance, housekeeper and other non-medical personnel, especially as regards formal education and on-the-job training requirements. The whole question is whether or not some of this type of personnel might get very rudimentary training that might permit them to pick up certain types of tasks. The unionization constraint is very clearly potentially present. One cannot assume unionization away in model building, but one can ask a question. What is that unionization really costing us in terms of union delimitation of tasks? What is it doing in terms of requiring us to have three R.N.'s or three L.P.N.'s, etc. where two might do, and where for a vast majority of their time, the personnel find their skills under utilized? Throughout the whole health care field you do not see optimal utilization of manpower in health care delivery. A ward staff is headed by an R.N. who, among other things, maintains the medical records, but must she maintain the records? Are you really utilizing his or her skills and abilities 40 hours a week, or whatever that individual happens to work? I'm not suggesting that the hospital staff is not busy. The question I'm asking is relative to the training and skills they have and whether they are utilizing that skill most of the time. The answer to that, I think, is ambiguous.

The final point I wish to make today is that certainly, quantative analysis of some variety is going to take place in any health manpower analysis. However, it's highly unlikely that the person engaging in that analysis, at this point in time, is going to be a person with an extremely high-level quantative bent. The economist or management person conducting that analysis must be certain the assumptions implicit in his analysis are clearly spelled out to the health care planning personnel who will use that analysis. These assumptions then become one of the critical things which must be watched in terms of the way in which quantitative analysis is used in policy planning for manpower development.

TABLE I

Cost-Effectiveness Analysis of Hospital Staffing Policy and the Patterns of Work Assignments to Staff

Distinctions Among Types of Hospital Staff and Others Who Provide Services in a Hospital:

MD1 = Internes, Residents, House Staff.
MD2 = Radiologists, Pathologist, Anesthesiologists, Other Specialists.
MD3 = Hospital Associated MD's, treating individual patients.
RN1 = Staff Registered Nurses.
RN2 = Specialized Registered Nurses (OB, OR, Nursery, Coronary Care).
LPN = Licensed Practical Nurses (licensed either by exam or waiver).
MT = Medical Technologists (whether licensed or not).
PP = Paraprofessional (nurses aides, orderlies, etc.).
HK = Housekeepers, and other Maintenance Staff.
WMS = Ward Record Keeping and Managerial (non-medical) Staff.
XX = Other Hospital Personnel (transient on wards on specific business).
VIS = Visitors (Family and Guests), and Parents sleeping in on a Ped. Ward.
PTS = Patients (who must be admitted to, to varying degrees, being capable of helping themselves or each other).
VOL = Hospital Volunteers (who are directed to tasks by the hospital).

Physical Characteristics and Requirements in a Hospital or on Wards
(Some of these variables can be clearly seen to be primarily relevant only with respect to the measurement of characteristics of single ward.)

RMS = Number of Rooms.
BED = Number of Beds.
AVT = Average elapsed time for a fast walk from (the nearest) nursing station to a patient.
MXT = Elapsed time for a fast walk from (the nearest) nursing station to the farthest patient.
LGR = Maximum Permissible Lag in Response by an RN or MD to a patient's call.
LGL = Maximum Permissible Lag in Response by some ambulatory person to a patient's call.
WRD = Number of Different Wards in the Hospital.
ORS = Number of Different Operating Rooms, Including Delivery Rooms, in the Hospital.

Patient Care Need Variables in Defining Manpower Needs and Utilization Patterns
(Many of these variables reflect data which would be collected for the hospital as a whole and each of the wards individually, although some would clearly not apply to certain types of wards.)

TAA = Total Annual Admissions.
MDA = Median Daily Admissions.
STA = Median Patient Stay (in days).
RPO = Percentage of Admissions which are Routine Pre-Operation Cases.
TER = Percentage of Admissions which Turn Terminal on the Ward or in the Hospital.
AXE = Total Annual Trauma or Emergency Admissions.
EQ(i)= A list of Different Types of Rapid Response Equipment Needed for Patient calls, and skill requirements for their use. (i=1. . ., I, for I different types of such equipment and associated skill requirements.)

TABLE I (Cont.)

Variables and Potential Constraints which are Largely Subject to Hospital Administration Discretion.

(Some of the variables below, as indicated by a "*", apply to the different persons found in a hospital, as distinguished in the list of staff categories and other persons in a hospital.)

VHR = Visiting House permitted per day (for hospital as a whole, and for wards, private rooms and other exceptions).

RGS* = Regulations guiding permitted medical or medical-related activity by volunteers, visitors, staff categories, etc.*

MON = Room Cost and Other Hospital Charges, and the differentiations for a variety of special services rendered.

QUA* = Qualification criteria for service, maintenance, housekeeper and other nonmedical personnel, especially as regards formal education and on-the-job training requirements.*

Other Factors and Constraints on Staff Utilization and Task Assignments.

(All of these variables reflect application to specific categories of personnel; for that matter the source of the constraint may vary from one group to another, with union regulations, professional codes, and the like.)

AVL = Availability of Different Types of Manpower

PAY = Rates of Pay (minimal and ranges) for Different Types of Manpower.

PRF = Professional Association and Union Rules, Regulations and Policies Governing Manpower Utilization (including regulations protecting their professional prerogatives and privileges).

LEG = Legal and Regulatory Agency Constraints on Manpower Use and Staffing Patterns.

TABLE II

Cost-Effectiveness Analysis of Manpower Development and Utilization Patterns in Provision of Public Health and Ambulatory Care

Distinctions Among Extent and Possible Types of Personnel who may be Used in the Provision of Public Health and Ambulatory Care.

MD1 = General Practitioner or Internist.
MD2 = Specialist, including General Surgeons.
RN1 = "Typical" Registered Nurse, with no advanced or special training.
RN2 = Public Health Nurse.
RN3 = Nurse Practitioner (as in Pediatrics).
PHR = Pharmacist, attached to some "drug store."
LPN = Licensed Practical Nurse, normall attached to some MD's Office.
MDW = Midwife (with variable skill levels, but assumed to be an adjunct to some obstetric practitioners, and attached to a hospital or clinic with delivery facilities.)
DA1 = Physician's Assistant, trained in preliminary diagnosis and with some basic skill in therapeutic care (knowledge of medicinal alternatives.)
DA2 = Physician's Assistant who is a specialist in the provision of some form of therapeutic care which requires extensive pracitioner time to deliver.
DA3 = Physician's Assistant, with no independent judgment training, but capable of executing a broad range of basic tasks under supervision..
REL = Family Member or relative of a sick or hurt individual.
FAD = Person knowing rudiments of first aid and available to a sick or hurt individual.
AMB = Ambulance Personnel, assumed to have something beyond basic first aid knowledges.
POL = Police and Firemen, who have attended some training classes.

Critical Physical Limitations and Variables Affecting Manpower Utilization. (While the context of health manpower planning may be state or nation-wide, some smaller locational foci will be required, i.e.: counties or regions within states. Most of the variables identified below would have to be measureable for both county and larger areas.)

POP = Population of the Area.
PD = Population Density in the Area.
AGE = Age Distribution of the Population.
HSP = Number of Hospitals in the Area.
CLI = Number of Clinics in the Area.
TVL = Average Travel Time (surface travel) from (nearest) hospital, clinic, or MD's office to home of potentially sick person.
PTR = Average Travel Time from Patient's home to (nearest) hospital.
MXT = Maximum Tolerable elapsed time before emergency cases get medical treatment.
TND = Population Trends in the Area, by age groups.
DST = Number of Drug Stores.

Constraints and Possibilities Associated with Mobile Equipment and other Physical (non-human) Inputs to Medical Care Delivery.

MXR = Number of Mobile X-ray Units.
MDG = Number of Mobile Diagnostic Units, offering rudimentary therapeutic treatment in addition to diagnostic service and referrals.
FLY = Number of Helicopter or other extra-rapid transportation systems for critical cases and emergencies.
COM = Number of communications facilities associated with mobile units for transmission of information to specialists who can provide diagnoses and treatment instructions.

TABLE II (Cont.)

Further Population Characteristics and Factors Associated with Professional and Legal Regulations which Constrain or Facilitate Alternative Manpower Utilization and Health Care Delivery Systems.

(Variables marked with "*" have components, or separate vectors, which refer to the different types of manpower enumerated above.)

AVL* = Availability of the Specific Manpower Type.*

PAY* = Minimum Pay per Annum Needed to Retain the given Manpower Type.*

PRR* = Professional Association and Union Regulations of Manpower Utilization, both in limitations on expansion of some manpower's assigned tasks, and in limiting lower level manpower's right to execute more complex tasks.*

LEG* = Legal Constraints, including liability problems encountered in the redefinition of manpower responsibilities.*

TRX = Number of Trauma and Emergency Cases per year in the area in question.

ED = General Level of Educational Attainment of Adult Population of the area.

INC = Median Family Income adjusted to a per capita base for the area.

INS = Insurance Coverage provisions in the area, which affect the clients' ability to pay for services provided in "unusual" manners.

PRINCIPLES OF COST-EFFECTIVENESS ANALYSIS AND THEIR APPLICATION TO HEALTH MANPOWER PLANNING

This outline of aspects of cost-effectiveness analysis is gleaned from several Federal sources on the subject, with some minor modifications. Cost-effectiveness studies are frequently called by other names, some of which may be more familiar: cost-benefit analysis, cost-utility analysis, operations research or analysis (of which it is but one part), and the like. The use of the term cost-effectiveness was chosen for this outline in that the problem at hand, although two-fold, and somewhat complex, is very clearly focussed on effectiveness of utilization of resources to provide some desired level of services. That it, the first part of the problem is the most effective utilization of our existing health manpower to provide medical care today, while the second question is that of the most effective utilization of our medical education facilities to provide manpower for improved medical care services in the future.

Cost-effectiveness analysis is a quantitative technique which required the construction of some model into which numbers can then be plugged. Inherent in any model is some abstraction from reality. However, abstraction in and of itself does not imply the inapplicability of the results of the model to real situations. Although this quantitative analysis will normally require a qualitative supplement, quantification permits explicit study of the impact of various constraints imposed on patterns of manpower utilization (such as the provisions of Pennsylvania's Medical Practice Act or guidelines from the Joint Commission on Accreditation of Hospitals), and the derivation of the costs or benefits, in dollars or altered volume or quality of care provided, associated with such constraints.

Effort devoted to the construction of quantitative models will highlight data needs and possible data inadequacies. It may be that, in trying to determine which member of the physician's health team should execute particular functions, the analyst will expose a paucity of data on the explicit skill differentials of different members of the team. Hospitals, in trying to plan staffing requirements associated with expansions, may find that they have never time-logged admissions by type of care required in a fashion to permit projection of patterns of cases to the cases encountered per month or week is probably inadequate information: the problem may be a matter of the probability of two or more such cases requiring the hospital staff's attention at one time.

Health manpower planning efforts have to be keyed closely to demographic data, with regard to population age groupings, migration patterns, and the like. The economic base of a locality or county may be extremely important to the determination of the possible types of medical care available. Given the financial constraints, some optimization should be possible, but, in the absence of the constraints, no reality-keyed planning is possible. Therefore, cost-effectiveness techniques, while they will never provide pat answers, will help focus the attention of planners on the myriad variables which may be included in the analysis.

The real problem in cost-effectiveness analysis is not the identification of possible variables for inclusion in the model, but rather the determination of which factors may be effectively ignored. For example, there is no question

but that the medical school attended by a physician and the locales in which internship and residency were served are variables affecting his skill in different areas of his specialty in medicine. However, this skill variation is so small compared to the difference between a pathologist and a gynecologist (or between any other two specialties), that it might be safely ignored in the construction of a cost-effectiveness model. Distinguishing between the skill capabilities of hospital para-professional staff and volunteers who have served beyond, let us say, 1000 hours, is difficult, yet the distinction may be critical, in terms of hospital and physician liability provisions in the law, and other forms of constraints.

Examples of the logic and insights from application of cost effectiveness have been provided in the discussion above; the principles enumerated below are intended to assist decision makers in structuring problems for cost-effectiveness analysis.

COST EFFECTIVENESS ANALYSIS

1. An analytical activity, that is, a rigorous discussion of facets of a decision, should be an important part of any planning process.

2. Cost-effectiveness analysis provides for the examination and comparison of alternative courses of action that might be taken to achieve specified objectives for some future time period. Not only is it important to examine all relevant alternatives that can be identified initially but it is also important to design additional ones if those examined are found lacking. The invention of these new alternatives is one objective in considering Health Manpower Programs.

3. The primary purpose of cost-effectiveness analysis is usually not to make the decision, but rather, to sharpen the intuition and judgement of you, the decision makers. Identification of the relevant alternatives and clarification of their respective implications are of prime importance. This type of formal analysis can never, however, successfully supplant the importance of good judgement.

4. In a long-range-planning context, the following are some of the major considerations involved in doing a cost-effectiveness analysis:

> Proper structuring of the problem is all-important. The analysis must be addressed to the right questions.
>
> In making comparisons, an appropriate analytical framework must be used. For example, for a specific level of accomplishment of some given objective, the alternatives may be compared on the basis of their estimated economic resource impact; or (vice versa), for a given budget level, the alternatives may be compared on the basis of their estimated contribution to objective attainment.
>
> It is usually necessary to construct a model (either formal or informal) to be used in the analytical process. Here the main purpose is to develop a set of relationships among objectives, the relevant alternatives available for

attaining the objectives, the estimated cost of the alternatives and the estimated utility, or attainment of the aggregate objectives, for each of the alternatives. (Explicit statement of the assumptions inherent in the model is critical to its proper utilization as an abstraction from reality.)

Uncertainty must be faced explicitly in the analysis. A variety of techniques are available for treatment of the problem of uncertainty.

Although it complicates the analysis because of an increase in the number of variables, very often time-phasing of the impacts of the various alternatives is a requirement.

Since the model is only a representation of reality, it is desirable to do some validity checking of the analytical procedure; e.g., can the model describe known facts and situations reasonably well?

While cost effectiveness analysis stresses the use of quantitative methods, the analyst should not hesitate to supplement his quantitative work with appropriate qualitative analysis. One unfortunate effect of the application of quantitative techniques to decision processes lies in the tendency to ignore factors not included in the quantified model.

COMMON CHARACTERISTICS:

1. The systematic examination and comparison of alternative courses of action that might be taken to achieve specified objectives for some future time period. Beyond the alternatives that can be identified initially, the analyst must try to design additional ones if those examined are found wanting.

2. Critical examination of alternatives typically involves numerous considerations; but the two main ones are assessment of the cost (in the sense of economic resource cost) and the utility (the benefits or gains) pertaining to each of the alternatives being compared to attain the stipulated objectives.

3. The time context is the future (often the distant future--five, ten, or more years.)

4. Because of the extended time horizon, the environment is one of uncertainty (very often great uncertainty). Since uncertainty is an important facet of the problem, it should be treated explicitly in the analysis.

5. Usually the context in which the analysis takes place is broad and the environment very complex, with numerous interactions among the key variables in the problem. This means that simple, straightforward solutions are the exception rather than the rule. Furthermore, the more complex the reality, the greater the degree of abstraction in the model, and the more tentative are the quantitative outputs.

6. While quantitative methods of analysis should be used as much as possible, because of items 4 and 5 above, purely quantitative work must

often be heavily supplemented by qualitative analysis. Some mix of qualitative and quantitative analysis will normally be required for a balanced assessment of alternatives.

7. Timeliness is important. A careful, thorough analysis that comes six months after the critical time of decision may be worth essentially zero, while a less thorough -- but thoughtfully done -- analysis completed on time may be worth a great deal.

ALTERNATIVE ANALYTICAL FRAMEWORKS:

1. Fixed utility approach -- For a specified level of utility to be attained in the accomplishment of some given objective or group of objectives, the analysis attempts to determine that alternative (or feasible combination or alternatives) likely to achieve the specified level of utility at the lowest economic cost.

2. Fixed budget approach -- For a specified budget level to be used in attainment of some given objective, for group of objectives, the analysis attempts to determine that alternative (or feasible combination of alternatives) likely to produce the highest utility for the given budget level.

INTRODUCING UNCERTAINTY:

Since most really interesting and important decision problems involve major elements of uncertainty, a cost-benefit analysis of such problems must provide for explicit treatment of uncertainty. This may be done in numerous ways.

One of your major concerns with this problem will be with uncertainty about the demands for different types of health services in the future. The following types of analysis may prove useful:

Sensitivity Analysis -- Suppose in a given analysis there are a few key parameters about which the analyst is very uncertain. Instead of using "expected values" for these parameters, the analyst may use several values (say, high, medium, and low) in an attempt to see how sensitive the results (the ranking of the alternatives being considered) are to variations in the uncertain parameters. (For example, the demand for M.D.'s may be a partial function of the nunber of illnesses against which infant innoculation is a successful deterrnet. The number of such diseases may be varied.)

Contingency Analysis -- This type of analysis investigates how the ranking of the alternatives under consideration holds up when a relevant change in criteria for evaluating the alternatives is postulated, or a major change in the general environment is assumed. (For example hospitals may be located in towns A and B, and the effects of a clinic operating in town C might then be of interest.)

A Fortiori Analysis -- Suppose that in a particular planning decision problem the generally accepted intuitive judgement strongly favors alternative X.

However, the analyst feels that X might be a poor choice and that alternative Y might be preferred. In performing an analysis of X versus Y, the analyst may choose deliberately to resolve the major uncertainties in favor of X and see how Y compares under these adverse conditions. If Y still looks good, the analyst has a very strong case in favor of Y.

Creation of a New Alternative -- The three techniques listed above are useful in a direct analytical sense. They also contribute indirectly. For example, through sensitivity and contingency analyses the analyst may gain a good understanding of the really critical uncertainties in a given problem area. On the basis of this knowledge he might then be able to come up with a newly designed alternative that will provide a reasonably good hedge against a range of the more significant uncertainties. (In this context, some conventional constraints on manpower utilization and tasks might be assumed away and new alternatives thus developed. If the new strategies are sufficiently superior to the existing alternatives, a strong case against conventional constraints on health personnel use is developed.)

TIME IN THE MODEL:

More likely than not, the particular problem at hand will be posed in a dynamic context with time explicitly included in the model.

Perhaps the most obvious case in the context of health manpower planning is the role of time as a constraint on the provision of new health manpower. People currently entering medical schools, for example, will not become independent practitioners for at least six years, and, in the case of some specialties, much longer elapsed time periods. If the problem under consideration is cast in terms of the provision of health care services five years hence, a major increase in the number of practicing physicians is simply not a feasible alternative. (Note that this last statement implicitly assumes that physicians must be trained through the existing system; if a vehicle for training R.N.'s with certain types of experience for M.D. qualification were developed, M.D.'s might be trained in less than the six year period.)

In a more general sense, the nature of the problem may be such that the costs associated with different alternatives occur unevenly through time. The question then arises whether the decision maker is or is not indifferent concerning time preference, then the cost streams have to be "discounted" through time. This is a process of reducing all future costs to a "present value" by allowing for inflation and other time-related influences.

It should be pointed out that the analyst pays a price for introducing time explicitly into an analysis:

1. It complicates the analysis by increasing the number of variables and hence the number of calculations. If we put time in, we may have to take something else out.

2. As implied above, it complicates the selection of a criterion for evaluating alternatives: solution X may be better for 1975 and worse for 1980; solution Y may be just the reverse.

TESTING MODEL VALIDITY:

In the preceding paragraphs we have discussed building the analytical model, "exercising" the model (sensitivity and contingency analysis), etc. Since the model is only a representation of reality, it is essential to also include some checking to see if the analytical procedure used is a reasonably good representation, within the context of the problem at hand. This is difficult to do, especially in dealing with problems having a time horizon five, ten, or more years into the future.

In general, we cannot test models of this type by methods of "controlled experiment." However, the analyst might try to answer the following questions:

1. Can the model desirable known facts and situations reasonably well?

2. When the principal parameters involved are varied, do the results remain consistent and plausible?

3. Can it handle special cases where we already have some indication as to what the outcome should be?

4. Can it assign causes to known effects?

The confidence with which the analyst can answer "yes" to all these questions is a measure of the reality-reliability of his model.

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Dr. Harvey Wolfe is Associate Professor of Industrial Engineering, Operations, Research and Systems Management Engineering at the University of Pittsburgh. He also holds a faculty appointment in the School of Public Health at the University of Pittsburgh. Dr. Wolfe is a Johns Hopkins graduate and has been at the University of Pittsburgh since 1964. From 1967 to 1969 he was Director of Research for Blue Cross, Western Pennsylvania. His professional activities include an extensive series of studies of health and health manpower. Some of these include developing computer screening models for utilization and review; nursing staffing studies at Johns Hopkins, and his current work in development of generalized models for determining hospitals' true costs. This morning Dr. Wolfe will discuss the impact of industrial engineering on hospitals and the reimbursement implications.

THE EFFECT OF INDUSTRIAL ENGINEERING ON HOSPITALS AND IMPLICATIONS FOR REIMBURSEMENT

By
Harvey Wolfe, Ph.D.
Associate Professor of Industrial Engineering
Operations Research and Systems Management Engineering
University of Pittsburgh

I hope that this morning I will be able to present to you an alternative way to approach manpower problems. I think there are two ways to approach manpower problems and the first is one that has been discussed quite a bit; that is, to increase the supply to meet the perceived demands for personnel on all levels. The second is the way that I would approach the problem; that is, the better utilization of the resources that we already have. It appears that it's very difficult to plan for the future unless we have some base line in knowing what the people whom we currently have as resources are able to do, can do and for us to know how many of these people we have as input into the system. I'd like to describe for you what industrial engineering and operations research in the health services is and is all about, because it is quite different from the industrial concept that we all learned so well from The Pajama Game fifteen years ago.

First of all an industrial engineer typically studies man and his work place and that covers a wide range of endeavors, times, places and so forth. It is his objective to determine the most effective way to carry out an individual's tasks. I'll say quite a bit more about tasks as we procede because the concept of tasks is again different in the health context than it is in an industrial context. To differentiate between an industrial engineer and an operation researcher, an operations researcher examines a total system. A system that generally contains human interactions making the system extremely complex. He tries to find solutions to problems relating to that system by developing mathematical models, solving those models and hopefully implementing the decisions that are made.

Let me try to give you some kind of a summary of the development of industrial engineering and operations research in the health field. In the beginning, which was about 1953 or 1954, when operations research and industrial engineering in the health field began by a series of conferences. At that time there were several industrial engineers throughout the country who were doing small studies primarily in the areas of make or buy decisions; for example, should you use disposable gloves or should you clean them, how do you handle linen, etc. These types of studies were very closely associated with the kinds of problems that were tackled in industry and lest anyone here should say that industrial engineering in health didn't really begin in the 1950's but was developed by Frank Gilbreth of "Cheaper by the Dozen," granted that he did studies everywhere but the real impact took place in the 1950's.

These very simple studies eventually grew to industrial engineering studies of entire systems and the ones that perhaps have been most written about are the numerous studies relating to nurse staffing and other studies such as drug distribution systems, linen distribution systems and several others that I will mention as we procede and describe in a little more detail. This second generation of industrial engineering studies is the bread and butter of industrial engineering even today. This is where the potential exists for substantial cost savings in the hospital environment. The industrial engineering society has a division called the hospital division which has over a thousand members, all of whom are actively engaged in hospital industrial engineering. Most of these people are employed not by individual hospitals, but by what I would call combines such as the group at the Hospital Association of New York, CASH on the West Coast, some private corporations such as the Medicus Corporation which is located in Dallas and Chicago and so forth. There are many hospitals who do have, in house, industrial engineering functions and these frequently work out extremely well when the hospital can afford and support such a function.

There are really two more phases of the industrial engineering and operations research area that have come about. The third and fourth phases are really simultaneous phases. The third phase is the application of operations research, that is mathematical modeling, to large scale problems. An example of this perhaps is the location of regional facilities, e.g., the design of where to locate a centralized laundry. Larry Shuman, my colleague in the back of the room, wrote a doctoral dissertation a couple of years ago on Health Manpower. It's available from Johns Hopkins University Operations Research Department for those of you who are interested. There are a number of studies that have taken place and are taking place in the general area of large scale mathematical optimization decisions systems in the health field. Finally, the fourth stage and one in which this group has no interest - I shouldn't say no interest, it is not pertinent today, but I do wish to mention it - is the use of operations research techniques in determining the effectiveness of medical decisions. And this, of course, you've all seen on T.V. in terms of computerized diagnosis. We're all familiar with multiphasic screening and these are all things in which the operations researcher is actually getting involved in the medical decision process in trying to reduce the need for continued specialization as our enormous growth of knowledge takes place and outpaces the ability of any single individual to absorb all of this information.

Now I think it's pertinent that we examine phase two, the extent of industrial engineering studies, because it includes important implications both for the determination of manpower requirements and also for reimbursement of health facilities by third party payers and I guess I should qualify that by saying, Blue Cross and Medicare-Medicaid obviously the commercial insurance companies don't reimburse on that basis. The role of the industrial engineer in the hospital is basically to impose his techniques and knowledge to better utilize the personnel and facilities that exist there.

The industrial engineer uses three primary measures. The first of these measures is lower cost. When I say lower cost I'm speaking of a subsystem, because the industrial engineer has no expectation of reducing overall hospital costs; however, he does have the expectation of trying to reduce the increase that takes place annually in costs. He also considers another of his measures to be higher productivity and this basically assumes that the cost remains constant and the work that can be obtained from the individual personnel because of better methods, better equipment and a more scientific approach in carrying out their tasks can

increase productivity. The third measure is better quality. I mention better quality because I'm sure that every time you hear an industrial engineer speak the one criticism one has is, well you can't make any changes because you affect the quality of the institution. I say to you, don't fall into that trap. There's a serious question in my mind of what higher quality means. If higher quality means getting a glass of water when you want it, I don't know if we should pay for it. Should we provide quality that is in excess of adequate? What are the implications of providing quality that are in excess of adequate? If we have to utilize our resources, we need to assume from a societal point of view that the resources that we have should be used to at least provide the minimal acceptable quality care for every individual in our system.

I did a study several years ago, it appeared in Nursing Research in 1965, in which we determined what the difference in cost would be for running several nursing units based upon providing the minimally acceptable quality, an average quality and a highest possible quality. The difference was a factor of three. The minimal quality could be obtained for about $250,000 in nursing salaries. The highest quality about $750,000 and the average quality about $500,000. Now I'm not recommending that we have a minimal quality systems, but I think that all the evidence that we have so far has shown that adding additional quality doesn't have any measurable effect given the way we currently define quality in terms of patient satisfaction and so forth. So I think while we have to consider quality as a measure, we have to be very careful about what we call quality and how we use quality in making our decisions. If we can get better quality for the same dollar as frequently occurs in nurse staffing studies rather than a saving of cost then this is certainly a worthwhile objective.

Let me give you an example of better utilization of personnel and let me put this in the context of nurse staffing studies since these are the ones that occur most frequently and, in fact, can have the greatest impact. There really are only four methods of nurse staffing. The first one is well-known and widely-used and that is what I call the "seat of the pants" method. You have a Director of Nursing who says we need so many people here and so many people here and so many people here and in a small enough hospital this is a very effective method, probably the best method you could find. A real problem occurs when the size of the hospital increases and the Director of Nursing or whomever's doing the staffing for the facility can no longer handle all the information that's available. Then she has to go to one of the more rigid systems. The one that is extremely popular is the use of some fixed ratio, some constant like 3.5 nurse hours per patient day or something of this type. I can only classify this kind of a system as being a remnant of the Middle Ages. It takes advantage of no information whatsoever except that somebody did a study one time and came up with some number as being reasonable. This number does have meaning and importance, but not used in the context of staffing. There really are only two viable ways of staffing nursing units. One is to keep the patients where they are and to move the nurses and the other is to keep the nurses where they are and move the patients. If you keep the nurses where they are and move the patients, we call that progressive patient care. Progressive patient care works very well if you've tailored your facilities to accommodate progressive patient care. If you're working in an existing facility where you can't very well move the walls and accommodate the facilities to progressive patient care, it doesn't work out very well. In such cases you have to go to the second system which is commonly called "variable staffing" or controlled variable staffing. This technique works reasonably well also. It's used in most of the sophisticated health facilities in the country.

There are many techniques available for determining what the variable staffing should be. The original study by Connors at Johns Hopkins in the late 1950's is the system upon which most methods now used are patterned after. These adaptations require a great deal of work in terms of determining what the parameters are and how to set up the system. Recently I worked on a project which I'll describe in detail later, in which we did a nurse staffing study using subjective estimates rather than gathering real data. All we did was very carefully construct a format for the nursing personnel to tell us exactly how many and what kinds of personnel they needed in order to accomplish various tasks. This system can be implemented in a hospital in five weeks. It's a very very quick system. No, it's not as good as a system where you work out every number in detail, but it's an effective system. And in the hospital where we did the study, it saved that hospital, a 200 bed community hospital, approximately $31,000 a year in nursing salaries because of the mix, not the numbers of personnel. This saving was achieved because prior to the study the ratio of various kinds of personnel within the nursing unit had no bearing whatsoever to the tasks that had to be carried out. Now as long as I've talked about tasks again, let me make very clear what I mean by task. A task in a nursing context is really a function. It's something that the nurse does. We know that these tasks are highly variable. Nursing tasks are not similar to those of the guy who is working on a drillpress where he knows that every ten seconds if he lifts his arm and pulls down, something's going to happen, moreover he knows that the next time he's going to do the task, it's still going to take ten seconds. In the nursing situation things can take very short or very long periods of time.

We did an experiment about two years ago in developing factors that affect quality of nursing care and this experiment consisted of placing a closed circuit television system in a patient's room with a switch such that every time any hospital personnel entered the patient's room we had a complete video tape of exactly what took place. Meanwhile, if nobody was there nothing was recorded on the tape. In order to evaluate all of the patient care that was taking place, all we had to do was look at a tape that took an hour and a half thus eliminating the need to use highly trained people to sit there and watch 24 hours of care in order to get an hour and a half of meaningful information. Furthermore, we could have a whole panel of qualified people examining the tape and seeing the exact same thing from the same angle, something that does not occur when you use human observers. It was kind of an interesting technique and we derived all sorts of information from it. But one thing pointed out quite clearly is that things never occur the way you expect them to occur. The patient was extremely obese and we think in time study terms that giving a patient a bedpan takes some figure like 28.3 seconds. Well it took 25 minutes to get this lady on the bedpan, it required several personnel, and it was an extremely complex task. So I use this example to caution against thinking of tasks in the common context of industrial situations. The reason we use tasks is to get estimates. We don't expect the task to occur in the same time interval each time, but if we find that a bed bath takes a certain amount of time on the average, we can utilize this information at a later stage.

Now this brings up the question, can industrial engineering programs be effective? During the past year we conducted a very interesting experiment under contract from the Federal government in which we tried to tie in industrial engineering with incentive reimbursement. I don't know how familiar you all are with the term incentive reimbursement. This is a beautiful name. You know I'm not sure what it means except that it's one of the nicest names we've come up with to associate with any area of study in a long time. Incentive reimbursement basically

means that you provide the hospital with a financial incentive for performing the job that it probably should perform anyway. This is a methodology that has been tested in industry and it is quite effective. But there's a big difference. In industry your motivating an individual. You're saying to the manager of a corporation if your company makes $25,000,000 profit we'll give you a million of it or 4% and the corporation executive really pushes quite hard to get his million dollars. If you tell a hospital, we'll give you a million dollars, they don't know who gets it and they don't know what to do with it. If they got the money the chances are they'd put it in some kind of equipment that would increase costs for next year. So it's a very difficult concept to try to determine what motivating a hospital really is.

We came out with one system that was totally unacceptable but certainly would be the greatest motivator we could find and this is that the administrator of the hospital gets 50% of the difference between projected costs and actual costs for the year. This would mean that some administrators would get a half a million dollars a year, but we think it would be very effective. Unfortunately our society can't accept any of these systems and since it can't we've studied other kinds of incentive systems and I'll try to discuss some of these this morning.

The project that we worked on was probably the first real experiment in seeing whether incentives could motivate a hospital if given in dribbles. Our task was to select three hospitals, place an industrial engineer in each of the three hospitals and then based upon the savings that could be generated in these hospitals, pay these hospitals an incentive. The incentive was calculated in the following way. We included only real savings, that is if you say I need another pharmacist and the industrial engineer says you don't need another pharmacist, that's not a savings. The only way you have a savings is if you have a reduction in the payroll or materials or equipment costs of the particular unit. It had to be a real proven implemented savings. We took the total amount of that savings; let's say the savings was $100,000, their Blue Cross patient days in that hospital were approximately 40%, then we would say that 40% of that $100,000 were savings to Blue Cross patients and therefore that $40,000 should be part of the incentive system. We took the $40,000 and we hypothesized that the hospital should get half of it and our subscribers should get half of it. So we would pay the hospital $20,000, as a bonus over and above their regular reimbursement, for achieving and implementing savings. We also wanted Medicare and Medicaid to join us in this experiment since together with Blue Cross these orgnizations cover 65% of the total hospital days in Western Pennsylvania, thus incentive would have been more powerful. Unfortunately they declined on the basis that they would get the savings anyway and they didn't have to share any of it. We had serious arguments, but they, having the money, won. At any rate the industrial engineers were placed in the hospitals.

The hospitals were selected such that we had a university hospital, a metropolitan community hospital and a non-metropolitan hospital. The hospitals were not the highest cost hospitals in the area. They did have, through an index that we created, certain characteristics that made us feel that they would have reasonable potential for substantial savings. We placed industrial engineers in these hospitals for one year - let me say that we did not have very highly skilled industrial engineers because the one year restriction on time made it very difficult to acquire the kinds of people you'd really like to put into these systems. We were fortunate, however, in getting a supervisor for these people,

a guy who the week before had retired at the age of 65 from U.S. Steel as a top notch industrial engineer and at 65 and three weeks was just as competent as he was the week before. He supervised our people and he really did a marvelous job in giving them the expertise they needed to really implement studies. The areas that were studied were engineering and maintenance within the hospital, housekeeping, nursing, dietary, sewing, (one hospital had the largest sewing department, outside of Singer, in the entire country) the laundry and the business office. Each industrial engineer along with the liaison people that he worked with was allowed to select the particular areas he wanted to study to accommodate the particular hospital. Did it work? The savings in the year period (understand what a limitation that year was in terms of the kinds of things we could tackle) were in excess of $350,000 for these three hospitals. The implemented savings at the end of the time period was over $150,000. These were savings that were actually achieved and a great part of the reason for not achieving another $170,000 of the savings was the fact that the nursing studies resulted in a decision to replace R.N.'s who left the hospital with L.P.N.'s since no L.P.N.'s were available to fill the positions the hospital was forced to refill them with R.N.'s who were essentially over-qualified for the tasks they were performing.

The incentive itself had very little effect. The real effect took place because there was an industrial engineer in the hospital. In addition that industrial engineer was free. I'm sure that had some effect too. Additional problems result when you give the hospital the money. What do they use it for? One hospital went out and bought a computer with some money. It was absolutely the last thing they needed and this is the problem with piecemeal incentive systems. You have to use an incentive system that controls the entire cost, not a little piece of it or else its virtually ineffective. In terms of savings for the particular areas that were studied these three analysts managed to reduce the cost of the hospital in those departments by 5% of the total budget. When I say budget, I meant the spent budget, not the hypothetical budget. Has the study had an effect on the hospitals? Sure it has. One hospital now has a two man industrial engineering staff; another hospital has hired our retired man from us, and the third hospital is negotiating. The proof of the pudding in terms of industrial engineering effectiveness is Children's Hospital in Pittsburgh. For those of you who are familiar with that hospital, it is an extremely sophisticated pediatric hospital, high quality, relatively large size. This hospital has the largest industrial engineering department of any hospital I've ever seen and it has the lowest cost relative to its characteristics of any hospital that we've examined. Let me just give you an example. We're talking now about relatively large hospitals, but even small size studies can be valuable and I love to tell this story because it is as far as I'm concerned it is one of great achievements. I do very very little consulting in hospitals because I feel that a hospital bringing in a consultant for such things as industrial engineering studies is about as cost ineffective as you can possibly get. They're much better off dealing with the large groups who can provide service on a contractual basis. One hospital asked me to come in and give a course for six weeks. It was two hours a day twice a week for six weeks on industrial engineering techniques and following the course, each week I met with three or four department heads such that over the course of two or three months I met with every department head in the hospital. Each department head had to come up with a plan for a study and perform their own studies. The only thing I did was serve as a kind of referee. They talked about their problems and I essentially helped them put the problem in industrial engineering form so they could solve it themselves. One of the great achievements was the problem of the blue

Chux. I don't know how many people here know what blue Chux are, but you all know what Chux are. Chux are paper diapers, disposable diapers, and in the hospital they use blue Chux. Nobody could ever explain why they had to be blue, but they use the blue Chux under the sheet in order to absorb for incontinent patients. The problem was that when nursing aides came to change the linen they left the blue Chux in the sheets. They then threw them down the laundry chute where they went through the washing machines and came out beautifully speckled with little blue Chux papers. The only way these blue Chux spots could be removed was to pull each piece out piece by piece and then to rewash the linen. Well, I can't emphasize enough how exasperated the laundry manager was. This was an extremely sore point and he didn't know what to do about it. We used a very simple advertising campaign, spent $8 on signs, and really pushed it through the hospital. The department head did all the work himself and the savings that resulted from that study were $600 a year in terms of rewashed linen and time to pick these pieces out. The study resulted in a tremendous sense of achievement for the laundry manager, and also for me, because we solved a problem whereby money was wasted for no reason at all. Taking advantage of the talents of the department heads using IE techniques to solve their own problems was a very effective technique and can be used in a hospital of very small size because it's a very inexpensive way to conduct a program.

How can the industrial engineer play a role in determining equitable arrangements for reimbursement purposes? In the future I expect that we will no longer reimburse on the basis of cost, but we will reimburse on the basis of charges. Everybody says that's what we should do, but we can't do it and the reason we can't do it is because nobody knows what hospital costs are. Certainly the hospitals don't know. The only thing the hospital can tell you is that it spent 1.7 million dollars for radiology. If you ask them how much a chest x-ray costs, they can't tell you. If they were permitted to set a price on a chest x-ray and if that year they have an overabundance of chest x-rays, they would make out like bandits. They would take in all kinds of money.

We have recently been doing a study in the determination of hospital true costs and in doing this we have learned why hospitals don't know what their costs are. We have now done studies in bacteriology and have recently completed one in radiology. Our end result is a listing of costs. Let me explain the project in more detail. What we do is we do detailed observations of every procedure that's done in the radiology department. We do time studies and work sampling. We make adjustments for indirect time, for the educational component, for everything that might be involved, and we end up with a computerized system. All we need feed into the computerized system is a list of the salaries of the personnel, the materials that are used, and the overhead allocated for radiology to the hospital and we come out with a complete listing of the cost of each radiology procedure. This is a very effective system because suppose the hospital raises its radiologist's salary by another $20,000. We can just throw this information right in the computer and we come up with a whole new set of costs. If the charges are based on those costs, then they are reasonable charges and I would see no reason why a reimbursement agency wouldn't be willing to pay charges based on the cost as long as they're calculated by a system such as the one I have described. I want to tell you that this one radiology study cost us over $125,000. We have a grant from the Federal government and we get additional monies from a group of hospitals to pay our students tuitions. All of this money has gone into this project with the output being very small, indeed. However, these kind of models provide an extremely important base or foundation upon which we can make decisions in hospitals. Using our models if

you calculated the cost for radiology at one hospital and the cost for radiology at another hospital, then you could effectively compare the two. Currently we can't compare anything because we don't know what went into the costs and we don't know whether they're following the same procedures. In fact, we don't know very much of anything. This radiology system is currently being used to price radiology at Presbyterian University Hospital in Pittsburgh and we are now experimenting with what it's going to cost to adapt that system to Children's Hospital. I think you can see we're dealing with a whole different class of patients. But I also think you should note that we have found no differences in time yet in terms of the time it takes to do the procedures. So that the differences in hospitals that one always alludes to (you know every administrator says my hospital is unique) are not so unique at all if you look at the right pieces of it. This kind of reimbursement is really quite far in the future because it's going to take a long time until we can amass this kind of data and information. However, what is probably more imminent are incentive reimbursement methods based upon productivity. Such productivity measures were initially developed by CASH, the Commission for Administrative Services in Hospitals. They have set productivity standards in many many hospitals on the West Coast. They have constructed an incentive system in which the hospitals are given a greater reimbursement as their productivity increases. This might be a very effective incentive system. I don't know how effective the incentive is going to be, but certainly the concept of using productivity is an easy one to understand. It is well-defined and it's one that's being considered in Western Pennsylvania.

The truth of the matter is that the real productivity does not increase because of the incentive. The real productivity increases because of two things. Number one is exposure. CASH testifies at rate hearings. They pull out the productivity records of hospitals, they embarrass hospitals every chance they get and by this method of making the hospital's productivity visible, they have managed to substantially increase productivity. They reduce the hours per patient day of various personnel catagories. They also have been able to reduce hours per patient day because of one other factor. They have an excellent staff who give good advice and good direction to individual hospitals, telling them how they can increase their productivity if they have a productivity problem. It's the combination of these two factors that really makes the CASH plan effective, more so than the incentive that's attached to it since most of the hospitals there are not involved with the incentive per se.

The savings that are potentially possible in terms of manpower are incredible. There are over 500 hospitals that subscribe to CASH. If the productivity of nursing personnel could be reduced from 5 hours per patient day to 4 hours per patient day for the number of patients in 500 hospitals, we're talking about enormous quantities of people. The potential in the CASH system is very very great and it's an approach that's worthwhile. CASH uses a task approach. They use the task to set productivity levels but they recognize the great variation in tasks. For example, if a patient is given a bed bath, it's treated as though the average bed bath takes 19.45 minutes although the industrial engineer doesn't expect to see the bed bath for any particular individual taking that amount of time. However, he does expect, for planning, manpower, and staffing purposes, that in a 30 bed unit you'll find approximately 583.5 minutes spent giving bed baths. These figures are reliable; the aggregate figures, not the individual figures. We develop the individual figures only to work back to the aggregates.

Summing up what I've said, manpower planning is oriented towards providing the manpower supply necessary to meet the demands for health care, but this goal necessarily implies some knowledge of what the requirements are. As long as people in the health field are technologically idle, that is working below their capacity, (the greatest example of this is in an operating room where nurses are technologically idle doing housekeeping tasks some 30% of their time sterilizing things). The operating room is a place of great abuse in terms of technological idleness. They are there; they are busy; they are working hard; they are just as tired when they get home as anybody else, but what they've done is not comparable to the skill that they possess. Unless we can bring these technologically idle people into more productive tasks and specify what the real requirements for various kinds of personnel are, then we can't predict our manpower needs. The point is, that if we do not utilize the right personnel for the right tasks, we essentially will be overusing certain kinds of people. And when we do that we have to ask ourselves the question, can we as a country afford to use nurses as housekeepers, or to use doctors to do very routine examinations for well babies when there's no problem, or to give allergy shots or so forth; can we afford to do this? Now those of us who are in the affluent majority, probably are very desirous of that extra glass of water and the pat on the head by the nurse, but every time we get that extra service in the hospital we have to ask ourselves the question, Who is doing without service somewhere else because we're using a luxury service and taking away personnel who could be used to provide important and critical services in other setting?

It's very difficult for me as an industrial engineer who has now been in health related activities for about 13 years to clearly state the tremendous progress that has been made in health institutions. I don't want to leave you with an idea that we are regressing in any way. Our problems exist because we are trying to do many things that previously we weren't able to do and a lot of the things that we used to do we're doing a lot better with better utilization of personnel, but we still have a very long way to go. Thank you.

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Dr. John Rizzo is a Professor of Business Administration in the Department of Management, Western Michigan University. Dr. Rizzo holds a Ph.D. in Industrial Psychology from Ohio State University. Upon completing his studies at Ohio State, Dr. Rizzo worked in the Public Health Service in personnel research before moving into the academic world to teach administrative science and management. For the past two years he has been at Western Michigan University. Prior to that he was on the George Washington University faculty in administrative science. He has conducted a number of conferences for health professionals concerning the application of management concepts to the health field. His research interests include organization behavior and development.

VARIABLES RELATED TO CHANGE

By
John Rizzo, Ph.D.
Department of Management
Western Michigan University

What I've selected to do today is to share with you, very briefly, some ideas on new advances in management. The areas were selected using certain criteria that I'll also describe to you. But before we get into topics or criteria, let me implant in your mind, or perhaps reinforce some models that I keep in mind when I try and work with people. Then there's no doubt about where we're going. My biases as an industrial psychologist are not soft-headed in the sense that I'm merely interested in people's happiness at work. I've been described as an industrial psychologist who at least cuts holes in the bag that he has over his head before he goes into an organization. I'm interested in productivity, like you are, and I think one of the outputs of organizations of critical importance is productivity. Although satisfaction of people might be one of those outputs, there's a relationship between outputs. I think productive people are happy if you want to put it that way. We're optimizing on the output side against the number of criteria, the most important in my thinking is in fact productivity. I think you can get that without doing it the way they built the pyramids.

So I have in my mind an input-output model where the manager is concerned with the acquisition of inputs and with the allocation of resources to produce desired outputs. These kinds of models are rampant in the literature now and are being very highly formalized.

I'll also be discriminating between effectiveness and efficiency. I like to think of effectiveness as related to the output side and efficiency as the input-output ratio. In other words, efficiency has to do with the cost of getting that effectiveness. Anybody can build, with a given amount of knowledge and technology, an automobile. Not everyone can sell it for $2,000 and to me that's where the efficiency idea comes in. You can get outputs but some cost more than others. I think the manager is legitimately concerned with input and output. He is also concerned with the structure and functioning of an organization, which is a way of thinking of the things that mediate inputs and outputs. I think the manager's job is to define those outputs, to acquire the resources and to set up the organization structure to accomplish what he has to accomplish, and then stay close enough to update his system. The last two years I have been heavily influenced by systems thinking, but not in the quantitative sense. I'll let those biases emerge as I work with you.

The topics I want to share with you are significant areas that I think that management is clearly starting to move into. I've picked five. The first one is objectives (the setting of objectives). The second one has to do with problem-solving, decision-making, and creativity which I've chosen to lump together. The third has to do with organization structure and design, and the fourth is leadership and supervision, having somewhat to do with direct interpersonal relationships. The final one is planned change . . . the whole area of planning for change.

You might wonder why only one, the last one in five, relates to the title "Variables Related to Change". I guess I view most of the manager's task as that of change. Those who simply try to keep an ongoing system running are referred to by some colleagues of mine as administrators rather than managers. But I think the critical part of the manager's job in addition to keeping things running smoothly that are routine, is to in fact engage himself in change processes. What he is after in all of the five areas I want to talk with you about is getting systems from here to there, setting up states of events that now don't exist. To me that's change. Or solving-problems, which of course is nothing more than a person's definition of the fact that these things aren't what they ought to be and therefore change is indicated. Strangely though there is a whole body of literature in practice that has to do with planned change and why it stands apart is a mystery to me. It may be because people who work in this area found it a good marketable way to enter organizations and do their work, by going under the glamour of the title of planned change. Actually when they get to doing their work they've got their fingers in many aspects of management. This is what I would predict anyway.

Let's turn to the criteria for selecting these topics. The primary one is that I know something about them and I don't know anything about some of the other things that perhaps are in the new frontiers of management! Luckily, other speakers have rather effectively covered topics such as incentives, information systems, and operations research. Those are very new frontiers as well. Another criterion is my hope that by picking these topics I can decrease your search time; to help you as administrators, managers, or operators in systems to more readily cut through the literature, pick a consultant, or whatever. It's an attempt to save you time so that you don't wade through the body of management literature (which is a horrifying task) where there's a tremendous amount of redundancy and very little of immediate use to the practicing manager. I've also picked these topics because we're getting experience with them. People who are interested in objectives, problem solving, structure and organizational design, leadership, and change have developed a technology for accomplishment in these fields. They have methods for acquiring change in these areas. There exists training and development technologies. There are skilled people who know how to coach you through these things, who know how to take an entire complex organization system and lead its members through skills development in these areas.

I don't have as today's objective, changing your skills. The format for changing skills is not through a conference like this. Nor do I have the objective of changing your organizations' because that's not going to happen through mixed groups such as these where you'll have to go back to your organization (if you haven't already said it here) saying, "I wish my boss had attended." So I'm going to be talking about areas where I'm going to assume you need help, you need practice, you need coaching, you need feedback in your organizations to

get this accomplished. This may not be an easy task but I won't take the stance with you that these are things that you should be doing, and I'm up here to tell you what bad managers you are. Most of these tasks require a great deal of work and I have great sympathy for the manager who's faced with the complexities that you are faced with, and who's burdened with the accountability if things go wrong, but who at the same time has little control over most of the events which affect his organizational life. I suppose I virtually view management as a horribly difficult job. I personally don't want to be a manager. That's why I'm a teacher of management.

Let's talk about objectives. I personally took a crack at managing last year. We have an organization at Western Michigan which consists of some 500 students who are in this organization for training purposes. They have superiors and subordinates and managerial responsibilities such as setting objectives, and so forth. I was asked to be President of it for the year. It's horrifying to know the sort of things that go wrong in the organization for which you catch hell at the top, things over which you have little or no control of a direct kind. Objectives can go a long way toward overcoming this and other problems. I'll try and cut through some advantages fast and see where they lead us. The emphasis on objectives is an emphasis on outcomes or outputs. They define new end states, new conditions that are not now existing. The criteria for good objectives are that they are measurable, are good standards of success and achievement, and have some challenge built into them. We're trying to teach managers how to do this. A difficult task, but a very rewarding one when you get good at it. One advantage of having measurable outcomes that you're shooting is that you know where you're going. And like Alice in Wonderland, unless you know where you're going, it doesn't matter how you get there. But with an objective, if you know where you're going, how to get there becomes a much simpler task to define. Although not that simple. We'll take up more of that in problem-solving and decision making. With an objective, you can devise ways or start generating new ways, to get where you want to go.

If you set objectives correctly you are able to discriminate between activities and outputs. That is, activities are not confused with the ends or outcomes they devised to achieve. Last night here in a group we were chatting and someone was talking about dental services. They defined the problem in terms of number of visits to dentists in a community being atrociously low for certain socio-economic groups. A good manager thinking about objectives might not accept an increase in the number of visits to dentists as an objective. He would first consider alternative outcomes, some thinking on other objectives, before he would accept that one. For example why not define the objective in some measurable definition of a healthy mouth. Then whether or not people visit dentists in order to achieve that becomes a debatable question or a question for analysis. So you force yourself into thinking about end states. In our example, visiting dentists becomes an activity toward achieving the objective defined in some quantitative or qualitative description of a healthy mouth. And so the manager who thinks objectives keeps forcing ideas on what the end result is that you're really after. Later he will determine which are the ways to get the results. Of course the activities or programs that evolve when you think of outputs measured in visits are quite different than those that evolve if your objective has to do with a healthy mouth. This is only one small specific kind of example. Others could be given.

Objectives are important because of challenge they can provide. I think if people have something to shoot for they tend to do better. There's a good body of literature coming out that says even if goals are set for people in some systematic way, they tend to perform better on the average than people who don't work toward goals. We know this is from a series of laboratory studies as well as from field studies of high need-achievers. McClelland at Harvard has pioneered in this area. One of the attributes of a high achiever is that he knows how to set goals. He gets a kick out of accomplishing things. He knows his own skills and he knows where he wants to go. Compare a kid who simply jumps off a swing to the kid who jumps off, draws a line, gets back on and tries to cross over it on the next jump. The achiever, of course, is the latter.

Objectives also give you a basis for work planning and review. It forces people in organizations to sit down and figure out where it is they really want to go. It forces an interaction process that's often vague and missing. Organizations are busy places. They're busy with activities, and many of these activities have outputs which are literally unknown and hard to decipher. I'm reminded of the guy who each night would fill a wheelbarrow full of straw, in a company, and take this home. The management and his boss let him do this. Straw was cheap enough and he seemed like a happy, productive worker. The guard at the gate was a little more skeptical, however. He would fiddle through the straw and see if there was anything buried in there before he would let him pass through the gate. Well, studying that small system you might think that this guy was taking straw. But what he was really doing was stealing wheelbarrows. In just looking at a system, it becomes awfully difficult to tell what people are actually optimizing against.

Another thing that objectives allow you to do is appraise effectiveness. Here when you get into the question of evaluation, you've been hit by the last few speakers with a lot of questions of evaluation. These questions have been important, some of them on analysis have been quite sophisticated. Let me give you a much simpler approach. Was the objective achieved? How's that for a point of evaluation? Once you've determined where you want to go, you can simply say, "Did we get there?" And that's not tough to know. If you've gotten through the difficulty of stating the objective you can certainly tell whether or not it happened, and whether it happened in the time that you said it was going to take, and whether it happened with the resource expenditures that you said you were going to spend in getting there, assuming that you've taken your planning into budgeting. Objectives therefore give you accountability in an organization. You know precisely what that objective is and if you've allocated resources to it properly you can tell roughly who it was that was involved in the success or failure in achieving the objective. You also have accountability in resources. You can tell for a particular objective just what kind of resources have been allocated to its accomplishment and therefore account all the way down to six hours a week on a typewriter for that particular objective, if you've done your planning job in enough detail. And if you really want evaluation and accountability and use objectives in a tough-minded management sense, you can use it for finding out who is responsible down to specific people. Myron Cohen likes to tell the story of an old fellow who enters the George Washington Bridge in a cart with a horse pulling it. The attendant at the toll gate says, "Fifty cents, please." The old man said, "I thought that was just for cars." "No, it's for any kind of vehicle," was the reply. The old fellow backed the horse out and went down the road a piece and came back up a few minutes later to the same toll gate. Only this time the horse was in the cart and the driver was pulling it. The attendant said, "Well, that's still 50¢." The old fellow replied, "Speak to the driver," You don't get this

kind of vague accountability through a system of objectives. People know what they're there to accomplish and if it doesn't happen there's no searching for who's accountable.

These objectives can be set for entire systems such as the objective for the Apollo Missions, which I assume could be something like getting two people onto the moon to do certain experiments and getting three people back alive. This seems like a fairly measurable kind of thing. Not very difficult to tell whether they got there, and if they did what was expected, and returned safely. But the enormous complexity of systems thinking to accomplish these things, from a managerial perspective, is nothing short of incredible. These things can also apply to objectives for single individuals. One can use measures such as percentage of sales, or number of customers for a salesman. In many jobs, one can measure the amount of time taken to accomplish given tasks, or the number and quality of outputs. There are literally hundreds of these.

Finally objectives are critical for program budgeting. Once you have an objective or a subset of related objectives in an organization, you can treat that as a program for program budgeting purposes. You can in fact cost out resources going into that objective. We've tried a program budget in our management department and for given subsets of the educational process where we have some educational objectives we can tell precisely the amount of dollars expended. A part of my work goes toward that program and the department knows precisely how many hours a week I spend on it and how much typing work I generate in order to accomplish those educational objectives, and other costs. They simply divide the hours by the number of dollars I make a year and assign it to that program, as with other costs. As an employee I'm split across some six programs in the department and for each program the costs are known. We can compute indexes such as how many dollars per student we're putting in every class by simple calculation. I'd urge you into program budgeting if you can get into it, especially if you can link it to the question of objectives.

Let's move quickly into problem-solving, decision-making and creativity. Here people involved in management thinking are falling back to the basics of problem-solving. We've developed technologies and training techniques for getting people to do some very simple things that we know produce better solutions to problems. There's over ten years of research on some of this stuff. There are some beautiful books out on it for improving your problem-solving skills in organizations. There are good consultant organizations who can teach you simple things like how to prevent the inevitable process of a group of people failing to generate ideas. Most groups which sit down to solve a problem set up an incredibly dysfunctional social process that makes it very difficult for the group to generate ideas. One postulate in problem-solving and creativity is that the more ideas you have to deal with at least at the outset, the better the solutions are going to be. And we can in fact specify for small groups things to do that they wouldn't ordinarily do to help come out with better solutions. For example, we can provide bosses in problem-solving groups with specific behavioral recommendations (like "keep your mouth shut") if he wants to improve solutions to work group problems. We happen to know that a boss who talks too much in the groups tends to inhibit idea-getting, because his ideas are not properly evaluated. They are evaluated because of who he is, and not on the basis of what he said. There are dozens of these guidelines that are available to you. We could even help you to decide when to participate in a group, or when to just make the decision yourself, or when to

flip a coin. These decision rules are not complex at all. Participative approaches to management are clearly indicated, for example, when the problem and implementation of the solution is one of acceptance on the part of people. Once you have the acceptance dimension running through a problem you're going to suffer if you don't include the right people. Or, your batting average at least is going to suffer on successes. One other bias that I failed to mention when I started out is that I view management as a probabilistic kind of profession. The world is so complex that his best bet is to keep acting on probabilities, and being sensitive to contingencies, and work to keep his batting average good. I meet effective managers all the time who think that if they can get up to somewhere around 500, they're doing pretty well. So don't let all kinds of crazy ideals eat you up as a manager because then you'll never experience any personal success.

In the area of creativity again there are some technologies being dealt with. Some of them are very, very interesting, others are tied to what I already said about group norms. There's an outfit around who has something I think they call synectics. They do such things as urge organizations who deal with creative problems to involve people in the solution who don't know anything about it. The premise of course is that experience, although good, tends to be an inhibiting factor in creativity. So they operationalize these things by saying don't put any experienced people in at least some of your problem-solving groups. We went through an exercise in a conference once where we asked people to think of something three inches long, a sixteenth of an inch wide, and a hundredth of an inch thick. We had them think in small groups of the various ways to break that object into two pieces. Of course we came up with a lot of action verbs out of which we selected a set and then told the people that what they were really trying to do was cut grass. Believe it or not a group of people like yourself who know probably very little about lawnmower technology will in fact come up with ways that are likely being researched in the field today for cutting grass. I won't tell you about some of the solutions we got but they were indeed creative and useful. In this whole area we are placing a heavy emphasis on taking time and new ways to generate ideas. This is a key thing. When you have an objective, use this time and these methods and set up group mechanisms and requirements for people in the organization to generate alternatives to reaching stated outputs. And I don't mean just alternative activities, but alternative resources as well. You will find that the world is loaded with resources who will in fact do your work for you. For example, everyone in this room is an employee or resource for a supermarket. You get the cart, you roll it down the aisle, you pick the item, you put it in the basket, you take it to the counter, you unload it and if nobody's around, you pack it, and if you drop something, you pay for it. It's incredible how they've defined you as a resource. But you know it accounts for the price of groceries too. It galls me to pay for it, that bothers me. Libraries could draw upon free resources. We have a system in Kalamazoo where the city library is under the school system. I can't understand why my good friend the library director doesn't allow me to give my son a slip of paper naming a book that I want on it because the library visits the schools all the time through various mechanisms and they have telephone communications as well. I could get a book back in a day by simply writing something down and using that poor little child to lug this book back and forth but he's a great resource for that. He'd probably love to do it. At least two or three times and then he might catch on. Expanding your resource base is something that is really catching on. We have students on problems where for any given minor output can list fifteen alternative activities and ten resources that might accomplish it. The resources are the people and things that can do the activity and very often the resources are resources that can be used that the organization would in fact not

have to hire or otherwise pay for. They can be done by people who'd be willing to do it and who'd get a side benefit or payoff from it. Witness the mother staying overnight in the hospital with a sick child. The mother is a clear resource to the hospital. Not an alien example to you, but I just want to reinforce the idea again.

As far as organization structure and design goes (our third area), ideas here are starting to emerge to help the manager deal with change or different situations. The first institutionalization of this, of course, was in the Research and Development divisions in business and industry where the organizations deal with change by setting up a "change division." They establish divisions, often in separate buildings or off in the corner, who are the ones that are going to take them off into the future. They invest in that, and often very heavily. The unfortunate part of the R & D group, of course, is that you create a sub-organization of people who now have to relate to the total organization and being frequently geographically separate, it increases the problem of communication. So although R & D groups have their functions in organizations, and they are set up for change, and organizations invest in this change, there are problems of getting production people for example to believe and think like engineers in R & D. One way they deal with that is by making some engineers report to the vice-president of production and then they supposedly get to like each other, or something. The attempt more recently is to get more changes in organization structure and design into the entire organization as opposed to embodying it and institutionalizing it in specific groups. Incidentally the antecedent to R & D organizations was what some of you may typically know as staff. These staff men of an organization, somehow often report at the top and do not have to be accountable to anybody in the direct productive function of the organization. The personnel officer, the accounting officer, marketing research and so forth. There's even some speculation here that these are often change oriented groups. They are there to "help," to "advise," the manager in what he's supposed to accomplish. Help him improve. Make things better. Change. They turn out rather to be a pain in the neck to the operating manager because they're always down there tampering with your operation and they "don't know anything about what you've been through over the last six months." They've got all these crazy ideas, and they dress differently, and they're friends with very powerful people so that makes them all the more resented. People are speculating that staff groups of this kind and maybe people out of R & D ought to report to the manager where change is desired for the period of time that change will take place. He would be under the evaluation of that manager, and paid by him. This is a wild kind of thing but it really puts the burden on the staff "change agent" to be effective. Because if he can't get change under those conditions, maybe the change is no good or he's not skilled enough. What it does do is take out the negative implications of power in the organization. It's an attempt to prevent the staff man's affiliation with top management becoming the major force to create the change. The problem with that kind of change of course is that it lasts only as long as someone is there watching it and as soon as they leave people go back to where they were, if they possibly can.

Organizations also use committees of course and that's another structure to accomplish change. I would recommend them although we need more sophistication in their use. We should treat them more as problem-solving groups as opposed to political configurations. Organizations are starting to legitimize idea sessions, idea meetings where any idea's worth the attention. Again, this ties to problem solving, decision-making, and creativity. The reasons some organizations are doing this is because it's tied to another output of organization which is survival. The threat that "unless we do these things we're not going to survive" is often a valid

one. But this kind of pressure on managers is often nonexistent in fields that are noncompetitive. You people are in a field that is essentially noncompetitive although if you don't start doing some things some people are going to do them for you. There may be firms set up to take over the sorts of things that you could or should do. It's happening in a lot of other fields.

Another way people are trying to structure organizations is to make them flatter. Just reduce the number of channels a person has to go through. They're also making them more flexible. They make them more flexible by the use of objectives and by the use of program management parelleling objectives where outputs are specified and resources are drawn upon to achieve those outputs. One other example is in the use of task forces set up that have a limited life. Their life lasts as long as it takes to achieve an objective and then the task force is disbanded. So program and task force management is being more widely used. The whole idea again is flexibility in structure. Responding to the problem. There is also an attempt to play down the sorts of things that make people unproductive in organizations but at the same time are so necessary and inevitable you can't give them up. Things such as status, pay, authority or influence that we ascribe to people, or decision making prerogatives to allocate resources. These things are played down by emphasizing task (objectives) first, then developing the appropriate structure to accomplish it.

Another thing that organizations are doing is setting up "integrator" functions . . . one guy in an organization with a certain kind of special personality and skills who can bring conflicting views together using conflict resolution processes. Those of you who have political or behavioral science knowledge are aware that there are conflict resolution models evolving that are now being turned into training technologies and put to good use. Organizations are beginning to formally recognize conflict. In a way, what I'm saying is that we're having a maturing process in some managements. However, it's not found in every organization.

Finally, under organizational structure and design (and this leads us right into the question of supervision and leadership) is that we're trying to structure organizations in response to not only the task but the nature of people involved. The big thing in leadership and supervision nowdays (although there's a great deal of fundamentals we still have yet to draw upon) is advanced thinking in what I would call a contingency leadership. Contingency leadership is an answer to the statement "You can lead this way or that way, but it all depends." In other words when you think as a boss you should do this the immediate answer maybe yes, but it all depends on something else. Contingency leadership is just a way of handling that. Do you for example tell a man what to do when he's not working? Well, it depends. Do you put a group together to work on this problem or do you just make assignments? Again, it depends. Now we're starting to find out what it depends upon. For example, some of the rudimentary, but very needed models (one incidently is out of colleagues of our speakers from Wisconsin) is in a monograph dealing with Matrix Organization or Matrix Management. It's basically on contingency leadership. What it says is that given certain attributes of a task and certain attributes of people, here's the kind of things you ought to do as a manager. It's rather prescriptive and straightforward and an excellent model to test. It has been tested although not thoroughly. It urges that if you have a situation where the people are of low ability or they're demotivated (that means they won't do what you want them to) or where the task is a repetitive routine kind of thing to which you can apply a known technology for accomplishing the task, where maybe you have part-time help, where the goals are stable, or the consequence of a mistake is very high you should manage in a given way. Take payroll for

example. It's got to go out on Friday and if it's not ready you have brought all kinds of problems you certainly don't want. Here you have a repetitive, routine kind of task where the consequences of error are kind of high and you need reliability. Any combination of these sorts of conditions points to what many of you may be envisioning as a relatively bureaucratic situation. You set it up once, you slick it out, you operations research it, you time study it, you get it set up and then you forget about it. Don't overmanage this situation. You can handle it fairly directively and bureaucratically. You can proceduralize it. You can build in some controls, but then you don't need a lot of managers running around trying to think they're earning their pay by keeping their fingers in the pie and doing nothing but messing up what could be a well greased system.

There are a whole series of other kinds of people and task configurations that require a quite different approach to management, a kind of supervision where the goals are ill-defined, where the problem is hard to get a handle on, where the people are professional or high ability, where the environment is unstable, where there are new goals, where expertise in the area is somewhat vague and hard to get a handle on. This says to forget that directive procedural stuff, avoid directive orders, get the right people involved, and call upon your problem-solving skill. There was a huge review of the literature in a recent journal that surveyed hundreds of articles on participative management. What it showed, lo and behold, that in half the cases things worked out fine and in the other half there were some negative conclusions. I have a feeling that one explanation is that managers were under all kinds of pressures to participate and they did it in all kinds of situations that were inappropriate and nobody was helping them with it. I don't think you participate on how to set up a screw machine to turn out 4,000 brass screws every morning. There's just little room for participation there except in a very minimum kind of sense. The lathe department does not have staff meetings to discuss screw production. One of the critical issues here is whether or not you can train managers to shift gears. Can a manager who has a certain personality configuration really be flexible enough to shift from a bureaucratic, procedural, routine kind of mode to one that's loose, one that requires a high tolerance for ambiguity and for absence of structure as well as a lot of interpersonal skills? We don't know. Some people think it's a personality question and therefore a selection and placement solution is indicated. But some people think it's a skills question and therefore we can train for it. I don't know the answer but if you've asked a man to change three times and tried to change him through training and he still doesn't, you know what to do.

The final area of plan change embodies all of the other areas. There are some large consulting firms that feel they can in fact take your organization through a change process. They have certain premises and I can only share a few of them with you in the time remaining. One premise is that it ought to involve the total organization. Another is that you start at the top. You don't pick off groups or levels in the middle and do some work with them. We've had study after study to bolster these premises. One in particular is a beatuiful one done in England, in which they trained a lower level of supervision, put them through a training program and turned them on. The supervisors trained loved what they were learning, things were getting done, turnover was down. Training seemed to have some effect. Then higher management got a little upset about some of the things these men were asking in the way of resources and so forth and eventually got up tight enough that they communicated some dissatisfaction with what was learned through training. You know, forget all that stuff you learned in the classroom, and let's get back to work. Inside of less than a year this organization lost a

number of these trained and experienced men. Those who left on the average had higher I.Q.'s and were considered better hires than the ones that stayed. So the argument is don't start your training way down the organization and don't allow your bosses to say, "Hey, all you guys down there are going to go through an organizational development process." I don't know how you don't allow your bosses to do that but don't be happy about it if it happens! Be very sensitive to the problems that are apt to occur. There's a great deal now in organization change and development says that we start at the top. Even to the point of saying we'll meet and work with the second level on Monday and the top level on Tuesday so that whatever the men down below say, we're going to keep feeding data into the top on Tuesday. Or meetings are held with several levels simultaneously. Development groups are configured to meet the problems at hand. The point is that if you want to take a system through change you have to deal with the system. You have to develop a total rewards system; you have to develop a philosophy of management. This takes commitment from the top and these change technologies recognize the need for commitment, recognize the systemic implications of change. They recognize that change is an attitudinal and emotional, as well as a skill or knowledge effort and they deal with both often using different processes. I would be cautious about what kind of attitudinal-emotional training I bought but that's a matter of individual preference.

We've also learned things like you can't pile change on top of everything else. This on the surface seems an obvious kind of thing but maybe not. There's a story about a man who visits his father who is watching a basketball game and the son says "What are you doing" He replies, "I'm watching a basketball game." The son asks, "What's the score?" "Eighty-four - eighty," says Dad. "Who's winning?" The old man said, "Eighty-four." Some of these things are really not that obvious, but they are fairly fundamental. They are things that you're highly apt to overlook in taking an organization through a change process.

These points were presented about as quick and dirty as I ever like to get, but you should recognize that most of this does require a commitment on your part to a change process and to doing new things. And you must cut out the time in your organizations to do it. I guarantee you that you won't get it done if you attempt to make it with all the other things you have to do. You have to view improvement on objectives, improvement on supervision, problem-solving, decision-making, and change as a legitimate part of your managerial action. If you view it as a side program in addition to everything else you have you won't get it done. A friend of mine likes to tell the story about a chicken and a pig walking down the street early in the morning and the chicken says, "Let's stop for breakfast." The pig says, "What do you suggest?" The chicken said, "Ham and eggs." The pig hesitated and said, "For you it's a contribution, for me it's a commitment." There's the idea. I'm not sure that you have to give up as much as the dear pig was asked to, but I do think that you have to commit your time, you do have to view that time as legitimate, you have to view that time as directly related to the long run success of the organization and perhaps inversely related to the short run productivity of the organization. In other words you may have to sacrifice some short run productivity in order to gain long run improvement. With that I thank you.

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For the closing presentation of this Conference, I feel very fortunate that we have with us Gerald Jazinowski, Research Economist with The Joint Economic Committee of the U.S. Congress. Mr. Jazinowski was an Air Force Intelligence Officer in the Far East, taught economics at the Air Force Academy, and served as consultant to the Pentagon and to the Office of Management and Budget, before joining the staff of the Joint Economic Committee. His undergraduate education was attained from The University of Indiana and his graduate degree is from Columbia University, both of these in economics. His speciality area is public expenditure analysis. This afternoon Mr. Jazinowski is going to talk with us about the Congress and how it makes resource allocation decisions.

THE U.S. CONGRESS -- RESOURCE ALLOCATION DECISIONS

By
Gerald J. Jasinowski
Research Economist
Joint Economic Committee
U.S. Congress

Introduction

As I understand it, the purpose of this conference is to assist the health manpower planning program "by focusing research findings and thinking from a variety of disciplines on the conceptual problems confronting the health manpower planning field today." This means that the focus is to a considerable extent upon analysis and the data that supports analysis. Other people who have talked at the conference confirm that. Some have talked about the problem of estimating the public demand curve for health manpower and the related data problems. Others have talked about the use of cost benefit techniques in, I presume, evaluation of alternative ways to achieve certain program objectives in the health manpower field. Thus, to a considerable degree, the emphasis has been on how analysis can improve the estimation of the public demand for health manpower, evaluation of various health manpower programs in achieving the desired demand levels, and other basically analytical questions.

The Joint Economic Committee has, of course, devoted a considerable amount of its efforts to championing the cause of improved analysis in public policy questions. We have conducted extensive hearings on the need to improve efficiency in the Department of Defense. We carried the banner of planning-programming and budgeting (PPB) as strongly as anyone in Washington for a number of years. And we have had a variety of hearings on technical subjects relating to how to improve public expenditure decisions: discounting, estimating public benefits, and other similar matters. We will continue to pursue these matters in the future because the current Chairman of the Joint Economic Committee, Senator Proxmire, is constantly turning to analysis as a way to make better public decisions.

Today, rather than stressing the advantages or need for analysis in public expenditure decisions, I would rather talk about the relationship of analysis to the political process and political decision-making. My remarks will draw heavily on Charles Schultzes' work, in particular his book The Politics and Economics of Public Spending. My points of emphasis will be:

1. Analysis as a decision-making process,

2. A model of the political decision-making process,

3. The role of analysis in political decisions,

4. Attempts to improve analysis in Congress and Public Law 91-519, "Health Training Improvement Act of 1970."

I do of course believe that systematic analysis can improve -- and indeed already has improved -- the quality of program design and evaluation affecting the allocation of resources within the government sector. But analysis must be understood for what it can and should do. It needs to be defended against the politicians who would dismiss it as an academic exercise. It also needs to be defended against academic types who fail to understand the political environment, and, more importantly, have so specialized their talents that the participants in the political environment cannot understand them.

Our aim, therefore, should be to understand what analysis can do and to discover the relationship between analysis and the political process. To realize that there is not an irreconcilable conflict between the two systems, but they are two different ways of solving problems or arriving at positions. They are also very closely interrelated and dependent upon one another, as we shall see.

Analysis as Decision-Making

There would seem to be little question about the need for analysis in public decision-making. The huge size of government activity itself would seem to dictate that we need to carefully manage the resources bestowed to that sector. But there is also the priority squeeze that faces us today. The public demands a wide range of government goods and services. As is the case with the individual consumer, the wants far exceed available resources. It becomes necessary to choose where to put our resources, to choose between the private and the public sector, and to choose among alternative ways to achieve certain program objectives. Clearly, the most efficient and effective programs should be chosen if we are to maximize our satisfaction with public programs. Such program choice can only be made by analysis of alternative programs based on data systems that approximate the real world.

What are the major characteristics of analysis as a decision-making process?

First, analysis calls for careful identification and examination of the objectives in each major area of government activity. It seeks to establish what are the fundamental ends of government activities: price stability, a cleaner environment, increased national security, etc. These ends become the criteria by which we later judge a program, along with certain fundamental economic criteria such as efficiency. Although economists often emphasize the criteria of a stable economy, and an equitable distribution of wealth, they probably emphasize efficiency in resource allocation even more.

The second purpose of analysis is to determine input-output relations for each government program. The inputs tell us the specification of the program, what labor, capital, and other resources provide the fuel for its functioning. The outputs are what the program yields: the change in quantity and quality of veterinarian manpower, improved water and sewer treatment plants, and the like. These outputs are the benefits of the program and eventually they must be

analyzed with respect to both the broad objectives or aims of government and the costs of the specific program. Not only must we decide what output we want, but how much of it for a given period of time.

The third objective of analysis is the identification and measurement of total program cost, for the current year and for several years into the future. This measure of cost should include both budgetary cost and external costs associated with the government activity.

The fourth aim of analysis, and here I use the term in its cost-benefit sense, is to consider all alternatives and to choose the most effective or least-cost means of achieving basic program objectives. We must force government managers to consider particular programs not as ends in themselves but as means to objectives and to pursue those objectives in the most efficient manner.

Finally, all of the above is to be done in a systematic way.

Thus, it could be said that analysis is a problem solving approach designed to find the most effective and efficient solution on the basis of somewhat objective criteria -- primarily the criteria of efficiency. It opens up the scope of problem solving by requiring that all reasonable alternatives be considered and that these be supported by extensive data on how each will work.

A Model of the Political Decision-Making Processes

As we have seen, analysis tends to influence the choice of both ends and means with a problem-solving approach that emphasizes analytical criteria such as efficiency and equity. Let us now look at a model of the political decision-making process based primarily on Charles E. Lindblom's ideas. Here we see that the criteria is political consensus achieved through the advocacy process, that the scope of choice is perhaps more narrow, that the process often does not focus on ends, and that decisions are made incrementally rather than with a view to the long-run. Lindblom, as many of you know, calls it the "science of muddling through."

Let us now look at Lindblom's view of how the world operates and the kind of decision-making process necessary to cope with it.

First, it is argued that it is extremely difficult to separate the ends and means of government programs. Often we understand the full meaning and intensity of our objectives only in the process of relating them to various means. An example that is currently quite relevant is defense. Many of us would agree to the objective that this country needs a strong national defense. The truth of the matter is we don't know what that objective means until we examine it in the light of alternative programs or means that we can use to pursue that objective; a system, MIRV missiles, the B-1 bomber, or success at the SALT talks. We probably also would all agree to the objective of reducing crime rates. But the alternative means for achieving such a reduction become ends when they impact upon the civil liberties of particular citizens.

There are other considerations that make it extremely difficult to talk about ends and means as precisely as the analyst would present the case. In some cases we actually "discover" our objectives as we pursue various means. MIRV is

such an attractive means to military planners it has had three objectives: to hit many targets with a few missiles, to penetrate a massive Soviet ABM system, and to guarantee the second strike capability of Minuteman. Another problem is that many objectives become means for higher objectives. For example, price stability is an objective of public policy because it improves efficient resource allocation and provides for a more equitable distribution of income.

In addition to these difficulties, many of our objectives are in conflict with each other. Full employment and price stability being the most obvious and perplexing example. Reducing food prices and maintaining farm income is another. And of course there are few public programs that are without conflict because the pursuit of an objective that would benefit one party is likely to harm another party.

The upshot of all this is that it is more difficult to establish objectives, to relate objectives to means, and to choose among objectives and means than the analyst would have us believe. In fact, it may be downright destructive to focus too much attention on final ends, according to the Lindblom thesis.

Accordingly, debate over objectives should be minimized because you can't separate means from ends. More importantly, debate over final ends should be minimized in order to obtain agreement among individuals concerned with quite different ends. Increased government funds for hospital improvement could be supported by both the AMA and the poor of the urban slums.

Analysis is proud. It weighs a multitude of considerations, takes a long look into the future, and generally consuls dramatic actions -- all this with confidence. Lindblom argues that this approach does not suit the real world and we ought to be more humble. That we do not have the sufficient information and experitse to easily predict the consequences of programs or means on objectives. That policy-making is more an art than a science. C.L.S. Shackle stated it well in his 1966 presidential address to the Royal Economic Society:

> Is the nature of things, the so-called human predicament, such that we face an endless examination in arithmetic, each hour presenting its sum, and the subsequent hours or years marking our answer right or wrong? If so, policy-making is problem-solving, there is an algebra of business which only needs to be supplied with a sufficiency of information to guarantee success. Or is the logic of things such that no such sufficiency of information can ever exist? Is policy-making, by necessity, an originative art? Art is the manipulation of constraints... Art is not arbitrary, unconstrained caprice. But the required knowledge may be knowledge of what can be done rather than what must be done.

Another aspect of the decision process, associated with Aaron Wildavsky, is the political costs of political decisions. Each political decision has an opportunity cost in the sense that it may foreclose opportunities for other actions with the individuals of the opposition. One might speculate, for example, that Senator Proxmire's efforts against the SST have foreclosed some opportunities for cooperation with Senators Magnuson and Jackson.

Both the costs of political decisions and the inability to foresee the consequences of our actions easily, are arguments for "incrementalism" in decision-making, according to Lindblom. Incrementalism is where we make progress by sequented steps, correcting and altering for unforeseen contingencies. Both objectives and moves toward objectives should be modest in the world of incrementalism.

Another major aspect of this model of the political decision-making is the importance placed on the advocacy process. It is argued that the analyst cannot relate all the significant consequences of policy actions to the many values and objectives in the society as a whole. The solution to this is to so structure the process that every relevant interest has a say in policy-making and, given competition among the interests, this process will bring out a clear understanding and resolution of the diverse objectives. The criteria for decision-making becomes consensus and only the political process can bring such agreement about.

In this model, which I personally think approximates the behavior of the U.S. Congress, decisions are reached through bargaining in an advocacy environment. In this way there is mutual adjustment among the diverse and decentralized interests of our society, not by clear agreement about specific ends but by the practical seeking of consensus on particular means. Charlie Schultze has summed it up as well as it could be in his book The Politics and Economics of Public Speaking:

> The approach is pragmatic and meliorative rather than radical and idealistic. It follows the spirit of the common law rather than the Napoleonic code, emphasizing muddling through rather than long-term planning. It stresses process rather than substantive criteria. A 'good' decision is one which gains consensus rather than one that meets outside criteria of efficiency and effectiveness. The political decision process has evolved in this way because it is a successful means of coping, in a reasonably free society, with the reconciliation of divergent interests and values and the inherent limitations of the human mind to predict the consequences of social policies.

The Role of Analysis in Political Decisions

It might seem from the previous discussion that analysis and political decision-making have nothing in common. Analysis stresses the examination of all possible alternatives in achieving a particular objective, picking among the alternatives according to certain objective criteria such as efficiency or equity, and taking the long-range view. Political decision-making, on the other hand, emphasizes the conflict of values and the search for consensus through an adversary process. The truth is that analysis and political decision-making make a marriage of sorts because they need each other.

First, it is not possible to evaluate particular programs directly in terms of political values or objectives. If we think of programs in terms of their specifications or inputs, the inputs must be translated into outputs before the program can be evaluated. The linkage runs from inputs to outputs to

values. If my objective is to reduce infant mortality, for example, I cannot decide upon a particular program without knowing what the specification of inputs, the resulting outputs, and the final reduction that each brings in the infant mortality rate. Participants in the political process must have some knowledge of the social production functions that translate program specifications into program consequences. Otherwise the bargaining process cannot produce a meaningful translation of political objectives into specific program decisions.

The need for an analysis of the social production function that relates program inputs to output has become even more necessary as Federal programs have become more complex. More and more it becomes impossible to make decisions about whether or not certain governmental programs will achieve your values without systematic analysis. For example, what is the effect of increased Federal expenditures for water and sewer grants throughout the country? Are the Federal expenditures additive to State and local expenditures already being made, or are they merely substitutes for these expenditures? If substitutes, they do not increase the resources allocated to cleaning the water resources in the areas. If the Federal funds are additive, however, they will increase the resources available for this purpose. Assuming that they are additive, what particular resources are increased, and what consequences do these particular resources have on various measures of environmental improvement? Alternative programs and expenditure levels will produce different results in terms of additivity and the mix of resource inputs and the impact of those on measures of environmental improvement. Only systematic analysis can tell us if governmental programs are achieving our objectives.

Analysis is also important to establishing the costs of the programs, which is an important element of the calculus of choice about programs. Knowing how something works is not enough. We also need to know what it costs us to get that level of performance.

Analysis is also important to program evaluation. Most social programs cannot be fully evaluated until they are implemented. Even if one assumes that the political processes operate in an incremental fashion, directing and altering programs at each step, there still is a need for systematic analysis. Each new step still must have knowledge about the last step. Only if we evaluate the consequences of this first step, through program evaluation, is it possible to know what step should be taken next.

Thus, it would appear that systematic analysis actually helps the bargaining process in the political arena. Analysis allows us to see the relationships between general values and the specification of relevant programs, in terms of their operational outputs, and in terms of their required inputs. All of this is essential for intelligent and relevant debate about policy choices that do involve conflicts. Vague and spirited debate is rarely the best way to resolve conflicts of interest. Nor is analysis incompatible with incremental change. Moving by small steps does not exempt us from knowing where we are going.

Attempts to Improve Analysis in Congress

Now I would like to finish up by discussing attempts to improve analysis in the Congress today and the Health Training Improvement Act of 1970.

Just before we start that I would like to first say something about the difference between the Executive Branch and the Congress in terms of their analytical capabilities. Let's assume that we accept my argument that the main way that analysis can affect public policy decisions is to identify costs and the production function for the programs. Leave the final decisions and bargaining to politicians.

Assuming that that is in fact what analysis should try to do, to what extent can the Executive Branch and the Congress do this? I don't think you can overemphasize the enormous difference between the Executive Branch and the Congress in applying analysis to making resource allocation decisions in our country. The Executive Branch has an enormous amount of manpower, talent, money, time, all the things that are necessary for either doing analysis, asking analysis to be done, and evaluating it when it is done. So the place to really impact in terms of analysis is in the Executive Branch -- in the abstract. Now if you take a particular administration and you don't like it and all that it entails you may find you cannot impact upon the Executive Branch because your analysis does not satisfy what they're interested in.

The Congress, on the other hand, is a very poor stepchild in this process. The amount of money it has for staff and the time it can devote to a particular issue is relatively small. The impression one gets in the Congress, and I think it's accurate, is that it operates somewhat on the edge of chaos. There is always three times more work than can be done. There is never enough talent to go around and many are just coping. That is not exactly true because there are times when people have more time and they sit back and they take a longer view. To some extent the Joint Economic Committee has the privilege of taking a longer view than some of the other committees of Congress because we're not tied in directly to the legislative process. But basically Congress has a tough time with getting the resources and the ability to either do analysis or to evaluate the analysis done by others.

There have been some steps to improve this. Congress has passed some recent bills which would improve the committee staffs. These require new efforts to enlarge the data systems of Congress. They require five-year projection from the Executive Branch and more detailed analysis from the Executive Branch on all new proposals. These would expand the Library of the Congress and would significantly expand the General Accounting Office to do cost-benefit and cost-effectiveness analysis for the Congress. This will move us ahead in enabling the Congress to apply analysis to political decision-making. This will still leave us a stepchild to the Executive Branch.

Now the Health Training Improvement Act of 1970. I'm not on the relevant committees for this bill and those people who work closely with it I'm sure could do a better job of explaining all the intricacies of the trade-off. As you know, it was primarily an act to increase the supply of manpower for allied health purposes. That is the major statement of the act's purpose. Now you have to realize when you're trying to understand resource allocation in the Congress you have to first of all find where in the Congress that decision is taking place. You have to find the committee, the chairman, the staff person who is handling the project, and all the rest of it.

In this particular case, on the Senate side, it was the Committee on Labor and Public Welfare, headed by Senator Yarborough and, further, his Subcommittee on Health, which is now headed by Senator Kennedy. This subcommittee held hearings and investigated what should be done in this area. In addition to it being located there we have to understand who the people are. Senator Yarborough for one. Senator Kennedy. Senator Jacob Javits for another. These personalities of course have a big effect on what kind of decisions are going to be made. Finally, you have to ask yourself what were the administration proposals and how were they evaluated.

The decision on this particular bill is reflected in the floor debate, the committee hearings on the Health Manpower Training Act of 1970, and the bill itself. What you'll see if you look through the bill is that there's a lot more there than just increasing manpower for health. There's a provision for studying the need and appropriating more money to bail out our medical facilities having financial difficulties. There's another section that provides funds to study the possibility of reducing regulation in the medical area. Regulations that prevent allied health people from doing some of the things that doctors do now. There also was an elaborate debate on whether we could take Vietnam corpsmen and make them health assistants through this bill. That was struck from the bill primarily because of a jurisdictional squabble with a committee on the House side in charge of veteran's matters.

If you look at the debate, the bill, and the hearings, you see some cases where analysis was applied. There was an effort to try to estimate the supply of doctors, the supply of nurses, and other related fields of health manpower, in order to give some idea of kind and amounts of training that should take place. Looking at these estimates, and I am no expert on it, I come to the conclusion while they may have been somewhat crude, nevertheless they were estimates of these important parameters. There also were attempts to analyze this program for five-year projections. Still, one may not be as impressed with the role of analysis as one is impressed with the trade-offs that are taking place among all these divergent groups in the political process. Among these are the political representatives trying to show leadership. Senator Javits, who is a very able person in the health field, went to great lengths to make his impact on this bill. Trying to alter it from what had been Senator Yarborough's version. So you have this constant juggling back and forth between the various participants, not only in trying to seek consensus, but also in trying to show leadership as we refer to it in the Congress. I could go on and say some other things, but I would just as soon now try to open it up to some questions.

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PROGRAM

HEALTH MANPOWER PLANNING CONFERENCE - May 17 and 18

Monday Morning

8:30 to 9:15	Registration
9:15	"Welcome" James I. McGuire, President Hospital Educational & Research Foundation of Pennsylvania
9:30	"Overview of Alternative Planning Models Currently used in Health Manpower Planning" Mary F. Arnold, Dr.PH Professor of Health Planning and Administration Pennsylvania State University
10:30	"National Policies and Priorities - Their Implications for Health Manpower." Leonard Lecht, Ph.D. Director, Center for Priority Analysis National Planning Association
11:15	Coffee
11:30	"A Micro Methodology and the Disaggregated Data Requirments For Analyzing Physician Productivity." Kenneth R. Smith, Ph.D. Assistant Professor of Economics Social Systems Research Institute University of Wisconsin
12:15	Lunch

Monday Afternoon

1:30 to 3:00	"Effects of Large Information Systems on: Manpower Planning Decisions, Resource Allocation, The Setting of Manpower Requirements." Robert J. Mowitz, Ph.D. Director Institute of Public Administration Pennsylvania State University

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Monday Afternoon cont'd.

3:00	Coffee
3:30 to 4:15	"The Manpower Data We Have Versus The Data Questions We Ought To Be Asking" Royal Crystal, Chief Community Profile Data Center, Department of Health, Education and Welfare
4:15	Adjourn
6:00	Cash Bar
7:00	Dinner-Penn State Room, Nittany Lion Inn

Presiding: Raymond H. Giesler,
Executive Director
Hospital Educational & Research
Foundation of Pennsylvania

"Decision-Making in Health Manpower"

David B. Hoover
Associate Director for Program Planning
and Evaluation
Division of Allied Health Manpower
Bureau of Health Manpower Education
National Institutes of Health

Tuesday Morning

9:15	"Insights from Cost/Effectiveness Analysis" Peter Meyer, Ph.D. Assistant Professor of Economic Planning Pennsylvania State University
10:30	Coffee
11:00	"The Effect of Industrial Engineering on Hospitals and Implications for Reimbursement" Harvey Wolfe, Ph.D. Associate Professor of Industrial Engr. Operations Research and Systems Management Engineering University of Pittsburgh
12:00	Lunch

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Tuesday Afternoon

1:30 "Variables Related To Change"

John Rizzo, Ph.D.
Department of Management
Western Michigan University

2:15 "The U.S. Congress -- Resource Allocation Decisions"

Gerald Jasinowski
Research Economist
Joint Economic Committee
U. S. Congress

3:00 Summation and Close

HEALTH MANPOWER PLANNING CONFERENCE

May 17 - 18, 1971

University Park, Pennsylvania

REGISTRATION LIST

ABRAMS, Lawrence
Assistant Dean
College of Allied Health Science
11th & Walnut Streets
Philadelphia, Penna. 19107

ALDERMAN, Jane
Health Planning Specialist
Office of CHP, State of W. Va.
Capital Building
Charleston, W. Va. 25305

BERNSTEIN, Stuart
Statistician
NIH-BHME-Div. Manpower Intelligence
9000 Rockville Pike
Bethesda, Md. 20014

CLOSE, Henry P.
Assoc. Dir. CME & Health Manpower
Greater Del. Valley RMP
551 W. Lancaster Avenue
Haverford, Pa. 19041

CONWAY, Helen C.
Dir., Health Careers Program
United Health Services
225 South 15th Street
Philadelphia, Pa. 19128

DAVIS, Helene R.
Consultant
NY-Penn Health Planning Council, Inc.
306 Press Bldg., 19 Chenango St.
Binghamton, N.Y.

DETMER, L.M.
Assistant Director
Bureau of Manpower & Education
American Hospital Association
840 Lake Drive
Chicago, Illinois 60611

ECCLESTON, Eleanor M.
Dir., Dietetic Internship
20 Human Development Bldg.
University Park, Penna. 16802

ELISON, George W.
Dean of Technologists
Lehigh Community County College
2370 Main Street
Schnecksville, Pa. 18087

ETTARO, Shirley W.
Assistant Professor of Nursing
The Pennsylvania State University
114 Human Development Bldg.
University Park, Penna. 16802

FOSTER, Daniel W.
Manpower Specialist
HMP, Dept. of Comm. Med., U. of Pa.
4219 Chester Avenue
Philadelphia, Penna. 19104

GOLLADAY, Frederick
Assist. Professor
Dept. of Economics
University of Wisconsin
Madison, Wisconsin 53706

GORIN, Louis
PHS, DHEW, National Inst. of Health
9000 Rockville Pike
Building 31, Room 3B-51
Bethesda, Md. 20853

HARNETT, Arthur
Prof., Health Education
Pennsylvania State University
270 Rec. Building
University Park, Pa. 16802

5/24/71 BH 1007: JM

INADA, George J.
Bur. of Health Manpower Ed.
National Institutes of Health
9000 Wisconsin Avenue
Bethesda, Md. 20034

JONES, Kenneth B.
Staff Representative
Pa. Medical Society
20 Erford Road
Lemoyne, Pa. 17043

KEELEN, Edwin E.
Systems Engineer
Westinghouse Health Systems Dept.
R & D Center, Churchboro
Pittsburgh, Pa. 15235

LaPAGE, William R.
Program Specialist
Central Pa. Health Council
"Timberhaven", R.D. #1
Lewisburg, Pa. 17837

LINIGER, Richard
DHEW, PHS
National Institutes of Health
9000 Rockville Pike, Bld. 31, Rm. 3B-47
Bethesda, Md. 20014

MAREADY, Jack D.
DHEW, PHS, NIH
9000 Rockville Pike
Building 31, Room 3B-35
Rockville, Md. 20853

NEUFELD, Ben
Div. of Comprehensive Health Planning
HSMHA
749 Parklawn Building
Rockville, Pa. 20852

NEWMAN, Pauline
Medical Research Scientist
Pa. Dept. of Health, Div., of Res.
& Biostatistics, H&W Building
Room 615, P.O. Box 90
Harrisburgh, Pa. 17120

PODGORSKI, Sophia M.
Dir., Div. of Nutrition
Pa. Dept. of Health
7th & Forster Sts.
Harrisburg, Pa. 17120

RAFFEL, Marshall W.
Director, Division of Biological Health
Professor of Health Planning
Pennsylvania State University
115 Human Development Bldg.
University Park, Penna. 16802

RUSTIGIAN, Jackie
Hospital Library Consultant
Coll. of Physicians of Phila.
19 S. 22nd Street
Philadelphia, Pa. 19103

SHUMAN, Larry J.
Assistant Professor
University of Pittsburgh
Pittsburgh, Pa. 15213

SCOLNICK, Adolph
Statistician
NIH, Bur. of Health Manpower Ed.
Div. of Manpower Intelligence
9000 Rockville Pike
Bethesda, Md. 20014

STAGL, Cynthia J.
Planning Analyst
Office of Comprehensive Health Planning
Dept. of Health
P.O. Box 90
Harrisburg, Pa. 17120

WALTERS, Lauren J.
Consultant on Health Manpower
Appalachian Regional Commission
1666 Conn. Avenue, N.W.
Washington, D.C. 20003

ZAWADSKI, Alfonso S.
Research Assistant
Pa. Dept. of Education
Bureau of Education Research
Harrisburg, Pa. 17110

PENN STATE STUDENTS

DePORTER, F. Gene
Program of Health Planning and Administration
27 Abbey Place
State College, Penna. 16801

BALDWIN, Daniel
Program of Health Planning and
Administration
Apt. 408
218 South Sparks St.
State College, Penna. 16801

CHENOSKY, Kenneth
Program of Health Planning and
Administration
218 South Sparks, #304
State College, Penna. 16801

CROSS, William
Program of Health Planning and
Administration
522 E. College Avenue
#314
State College, Penna. 16801

CUNNINGHAM, Richard
Program of Health Planning and
Administration
105 McKean Hall
University Park, Penna. 16802

RICKER, Brenda
Program of Health Planning and
Administration
122 Schultz Hall
University Park, Penna. 16802

COLLEGIAN STAFF

MARTELLI, Linda
121 Ritner Hall
University Park, Pa. 16802

WIGGINS, James
ACACIA
234 Locust Lane
State College, Penna. 16801